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VOLUME NO. 1

EXPLANATORY NOTES

FOR

DEPARTMENT OF AGRICULTURE

BUDGET ESTIMATES



FISCAL YEAR

1941

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Administrative Promotions

Provision is made in the estimates for within-grade promotions, where the average of the grade permits, on a basis which is being uniformly applied in the estimates for the fiscal year 1941, namely, one step for eligible employees in grades having a minimum salary of \$3,200 or above, who, on June 30, 1940, shall not have received a promotion since June 30, 1936, and one step for eligible employees in grades having a minimum salary of less than \$3,200, who, on June 30, 1940, shall not have received a promotion since June 30, 1938. With respect to certain of the appropriations, additional funds have been submitted in the estimates to cover all or a part of the estimated cost of the uniform plan. In other cases, no additional funds have been submitted. With respect to the latter, the estimates contemplate that within the appropriation totals, it should be possible to provide by absorption for full application of the uniform promotion plan.

The obligation schedules for all the appropriation headings under which departmental and field personnel are to be paid show, in the 1941 column, the full amount which it is estimated would be required to make promotions in accordance with the basis outlined above. In the instances where additional funds have been submitted for this purpose, such additional amounts are shown in the project statement included in the explanatory notes prepared by the Department for the consideration of the Committee on Appropriations. Where no additional amount is shown on the project statement in the explanatory notes it is contemplated that the entire cost thereof will be absorbed.

The Department will supply further, detailed information to the Committee about this entire subject. Such information is in course of preparation, but time has not permitted its completion for inclusion in the mimeographed notes.

Project Statements

Following the custom of previous years, for the sake of simplicity and avoidance of confusion, "Project Statements" as shown in this book in general are limited to a breakdown of funds appropriated or allotted directly to the Department of Agriculture and do not generally include funds transferred from other Departments or establishments, although the latter are included in the Budget expenditure schedules under the items involved.

The Project Statements printed in the formal Budget and reprinted in the Subcommittee Print include, in addition to the direct funds, projects dealing with funds transferred from other Departments -- for example, funds received from such agencies as the Navy Department or the Veterans' Administration, for the inspection of meats by the Bureau of Animal Industry, or the inspection of food and drug samples by the Food and Drug Administration. Where it is desired to examine a project statement which includes such transferred funds, therefore, reference should be made to the Project Statements in the Budget or to the Subcommittee Print.

Table 1
United States Department of Agriculture
Budget Estimates, 1941, Compared with Appropriations, 1940 (a)

1

Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
Group I, Action Programs:			
Agricultural conservation program (AAA)	\$499,560,000	\$498,560,000	-\$1,000,000
Parity payments (AAA)	225,000,000	- -	-225,000,000
Sugar Act of 1937	47,975,000	47,975,000	- -
Disposal of surplus commodities:			
Permanent appropriation Sec. 32	92,678,812	92,678,812	- -
Annual appropriation	113,000,000	80,000,000	-33,000,000
Federal Crop Insurance Act	5,923,200	5,528,928	- 394,272
Farm Tenant Act:			
Farm tenancy (loans, Title I)	40,775,000	25,000,000	-15,775,000
Liquidation and management of resettlement projects (Title IV) ..	1,987,400	1,500,000	- 487,400
Land utilization program (Title III).	7,423,330	1,102,500	- 6,320,830
Loans, Relief, and Rural	(b)		
Rehabilitation	161,450,000	(b)	(b)
Rural Electrification	42,790,000	(c) 3,200,000	(c) -39,590,000
Flood control (transfer from War Dept.)	(d) 3,000,000	(d)	(d)
Water Facilities Act	500,000	500,000	- -
Cooperative Farm Forestry Act	300,000	300,756	+ 756
Soil erosion control program	23,720,584	20,195,128	- 3,525,456
Commodity Credit Corporation	(e)	(e)	(e)
	(f)		
Total, action programs	1,101,633,326	776,541,124	-325,092,202

(a) The 1940 appropriations have been revised to reflect transfers pursuant to the Reorganization Act of 1939 and Reorganization Plans I and II, and other transfers in the 1941 Estimates. For details, see footnotes on subappropriation table.

(b) This item provided in 1940 by the Emergency Relief Appropriation Act of 1939, and is to be considered in connection with emergency relief appropriation for 1941. The 1940 totals in this table exclude this item.

(c) Rural electrification loans to be financed in 1941 by transfer from Reconstruction Finance Corporation.

(d) Provided for 1940 by War Department Civil Appropriation Act. Not included in 1940 totals in this table, since Budget Estimate for 1941 not available at this date (November 30, 1939).

(e) Appropriation of \$119,599,918 made to Treasury Department for restoration of capital impairment of Commodity Credit Corporation as of March 31, 1939 by Third Deficiency Appropriation Act, 1939.

(f) Excludes \$161,450,000 for Loans, Relief, and Rural Rehabilitation and \$3,000,000 for Flood Control.

	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
II, Other Activities:			
Office of the Secretary	\$918,397	\$868,122	-\$50,275
Office of the Solicitor	268,280	209,000	+ 720
Office of Information	1,971,910	1,939,950	- 31,960
Library	107,970	105,000	- 2,970
Office of Experiment Stations:			
Salaries and expenses	244,735	246,189	+ 1,454
Payments to States for agricultural experiment stations	6,848,750	6,865,000	+ 16,250
Special Research Fund	1,400,000	1,400,000	- -
Extension Service:			
Salaries and expenses	927,864	884,654	- 43,210
Payments to States for agricultural extension work	18,470,583	18,536,083	+ 65,500
Office of Foreign Agricultural Relations	196,396	196,666	+ 270
Weather Bureau	6,422,870	6,878,620	+ 455,750
Bureau of Animal Industry:			
Eradicating tuberculosis and Bang's disease:			
Regular appropriation	8,300,000	5,320,180	- 2,979,820
Reappropriation	4,000,000	4,000,000	- -
Other work of Bureau	8,368,712	8,238,320	- 130,392
Bureau of Dairy Industry	721,405	762,345	+ 40,940
Bureau of Plant Industry	5,415,509	5,049,842	- 365,667
Relocation of Arlington Farm	- -	500,000	+ 500,000
Forest Service:			
Acquisition of forest lands	3,000,000	1,000,900	- 1,999,100
Forest-fire cooperation	2,200,000	2,200,540	+ 540
Cooperative distribution of forest planting stock	100,000	100,000	- -
New England hurricane damage	- -	300,000	+ 300,000
Payments to States, roads and trails for States, and acquisition of land from national forest receipts.	1,811,000	1,781,000	- 30,000
All other, including protection and management of national forests, research, etc.	14,921,866	14,975,785	+ 53,919
Forest roads and trails	10,000,000	10,000,000	- -
Bureau of Agricultural Chemistry and Engineering	1,145,269	1,051,975	- 93,294
Bureau of Entomology and Plant Quarantine	6,199,809	6,518,000	+ 318,191
Bureau of Agricultural Economics	928,000	928,000	- -
Agricultural Marketing Service	6,096,388	6,166,755	+ 70,367
Bureau of Home Economics	325,085	325,085	- -
Enforcement of the Commodity Exchange Act	623,380	623,380	- -
Food and Drug Administration	2,707,338	2,959,658	+ 252,320
Beltsville Research Center	85,000	109,450	+ 24,450
Total, other activities	114,726,516	111,100,499	- 3,626,017

Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
III, Trust Funds:			
Forest Service: Cooperative work	\$1,000,000	\$1,000,000	- -
Agricultural Marketing Service:			
Farm products inspections	144,460	144,460	- -
Food and Drug Administration:			
Seafood inspection refunds	29,000	29,000	- -
Farm Security Administration:			
Payments in lieu of taxes and for operation and maintenance of resettlement projects	1,800,000	2,000,000	+\$200,000
State Rural Rehabilitation Corporation Funds	2,875,000	2,250,000	- 625,000
Miscellaneous contributed funds	99,000	78,500	- 20,500
Total, trust funds	5,947,460	5,501,960	- 445,500
Total appropriations and reappropriations, exclusive of Farm Credit Administra- tion	(a) 1,222,307,302	893,143,583	-329,163,719
Deduct reappropriations included in foregoing:			
Agricultural conservation program	- \$70,000,000	- -	+ \$70,000,000
Sugar Act of 1937	- 16,000,000	- -	+ 16,000,000
Federal Crop Insurance Act	- 500,000	- 100,000	+ 400,000
Farm Tenant Act:			
Title I (tenancy loans)	- 775,000	- -	+ 775,000
Title III (submarginal land program).	- 2,445,000	- -	+ 2,445,000
Eradicating tuberculosis and Bang's disease (Animal Industry)	- 4,000,000	- 4,000,000	- -
Control of European fowl pest (Animal Industry)	- 5,000	- 5,000	- -
Total, deductions, as above .	- 93,725,000	- 4,105,000	+ 89,620,000
Total, Direct appropriations, foregoing items	(b) 1,128,582,302	889,038,583	-239,543,719

(a) Excludes \$161,450,000 for Loans, Relief, and Rural Rehabilitation and \$3,000,000 for Flood Control.

(b) Excludes \$143,000,000 for Loans, Relief, and Rural Rehabilitation and \$3,000,000 for Flood Control.

Table 1 (a) United States Department of Agriculture
Subappropriation Table of Budget Estimates, 1941, Compared with Appropriations, 1940

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
OFFICE OF THE SECRETARY:			
Salaries	(a) \$618,210	\$597,620	-\$20,590
Miscellaneous expenses	(b) 109,110	105,000	- 4,110
Rent of buildings	(c) 191,077	165,502	- 25,575
Total	918,397	868,122	- 50,275
OFFICE OF THE SOLICITOR	(d)(h) 268,280	269,000	+ 720
OFFICE OF INFORMATION:			
Salaries and expenses	(c) 385,040	353,080	- 31,960
Printing and binding	(f) 1,586,870	1,586,870	- -
Total	1,971,910	1,939,950	- 31,960
LIBRARY	(g) 107,970	105,000	- 2,970
OFFICE OF EXPERIMENT STATIONS:			
Payments to States:			
Hatch Act	720,000	720,000	- -
Adams Act	720,000	720,000	- -
Purnell Act	2,880,000	2,880,000	- -
Hawaii	60,000	70,000	+ 10,000
Alaska	23,750	25,000	+ 1,250
Puerto Rico	45,000	50,000	+ 5,000
Title I, Bankhead-Jones Act	2,400,000	2,400,000	- -
Total, payments to States..	6,848,750	6,865,000	+ 16,250

Pursuant to the Reorganization Act of 1939 and Reorganization Plans I and II:

- (a) Includes \$21,600 transferred from "Salaries and expenses, Farm Credit Administration and \$20,590 transferred from "Salaries and administrative expenses, Commodity Credit Corporation"; and excludes \$5,900 transferred to "Salaries, Office of the Secretary of the Interior".
- (b) Includes \$1,360 transferred from "Salaries and expenses, Commodity Credit Corporation", and excludes \$500 transferred to "Contingent expenses, Department of the Interior".
- (c) Excludes \$2,523 transferred to "Rent of buildings, Biological Survey, Department of the Interior".
- (d) Excludes \$1,200 transferred to "Salaries, Office of the Solicitor, Department of the Interior".
- (e) Includes \$6,000 transferred from "Salaries and administrative expenses, Commodity Credit Corporation", and excludes \$4,000 transferred to "Salaries, Office of the Secretary of the Interior".
- (f) Excludes transfers of \$4,700 to "Printing and binding, Public Roads Administration" and \$18,000 to "Printing and binding, Department of the Interior".
- (g) Excludes transfers of \$750 to "Library, Department of the Interior" and \$500 to "Library, Public Roads Administration".
- (h) Includes transfers in the 1941 Estimates from other appropriations as follows:

"National forest protection and management, Forest Service"	\$1,600
"Industrial utilization of farm products and byproducts, Bureau of Agricultural Chemistry and Engineering"	1,600
"Enforcement of the Federal Food, Drug, and Cosmetic Act, Food and Drug Administration"	<u>33,800</u>
	37,000

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
OFFICE OF EXPERIMENT STATIONS: (contd.)			
Salaries and expenses:			
Administration of grants to States and coordination of research	\$161,735	\$162,939	+\$1,204
Insular experiment stations	83,000	83,250	+ 250
Total, salaries & expenses..	244,735	246,189	+ 1,454
Total	7,093,485	7,111,189	+ 17,704
SPECIAL RESEARCH FUND	1,400,000	1,400,000	- -
EXTENSION SERVICE:			
Payments to States:			
Capper-Ketcham extension work	1,480,000	1,480,000	- -
Extension work, Act of April 24, 1939	203,000	203,000	- -
Extension work, Section 21, Bankhead- Jones Act	12,000,000	12,000,000	- -
Alaska	21,418	23,918	+ 2,500
Puerto Rico	65,000	128,000	+ 63,000
Cooperative agricultural extension work	4,701,165	4,701,165	- -
Total, Payments to States...	18,470,583	18,536,083	+ 65,500
Salaries and expenses:			
Administration and coordination of extension work	(a) 586,416	554,016	- 32,400
Extension information	(b) 263,550	252,540	- 11,010
Cooperative farm forestry extension work	77,898	78,098	+ 200
Total, Salaries & expenses..	927,864	884,654	- 43,210
Total	19,398,447	19,420,737	+ 22,290
OFFICE OF FOREIGN AGRICULTURAL RELATIONS:			
Salaries and expenses	(c) 196,396	196,666	+ 270

(a) Includes Extension Service appropriations consolidated in the 1941 Estimates as follows: "General administrative expenses", \$126,246, and "Farmers' cooperative demonstration work", \$460,170.

(b) Includes Extension Service appropriations consolidated in the 1941 Estimates as follows: "Farmers' cooperative demonstration work", \$100,000, "Agricultural exhibits at fairs", \$85,000, and "Motion pictures", \$78,550 (exclusive of \$450 transferred to "Salaries, Office of the Secretary of the Interior" pursuant to Reorganization Act of 1939 (Plan II)).

(c) Excludes \$98,604 transferred to "Salaries and expenses, Foreign Agricultural Service, Department of State", pursuant to Reorganization Act of 1939 (Plan II).

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
WEATHER BUREAU:			
General administrative expenses.....	\$145,000	\$147,060	+\$2,060
Observations, warnings, and general weather service	(a) 6,027,870	6,481,560	+ 453,690
Total, salaries & expenses.	6,172,870	6,628,620	+ 455,750
Weather Bureau Building	250,000	250,000	- -
Total	6,422,870	6,878,620	+ 455,750
BUREAU OF ANIMAL INDUSTRY:			
General administrative expenses	170,120	171,920	+ 1,800
Animal husbandry	802,880	804,220	+ 1,340
Diseases of animals	462,000	466,100	+ 4,100
Eradicating tuberculosis and Bang's disease:			
Regular funds	8,300,000	5,320,180	- 2,979,820
Reappropriation	4,000,000	4,000,000	- -
Eradicating cattle ticks	475,000	340,670	- 134,330
Hog-cholera control	122,000	113,148	- 8,852
Inspection and quarantine	680,000	609,410	- 70,590
Meat inspection	5,433,000	5,507,160	+ 74,160
Virus Serum Toxin Act	218,712	220,692	+ 1,980
Marketing agreements with respect to hog cholera virus and serum	(b)	(b)	- -
Eradication of European fowl pest	5,000	5,000	- -
Total	20,668,712	17,558,500	- 3,110,212
BUREAU OF DAIRY INDUSTRY:			
General administrative expenses	75,500	76,340	+ 840
Dairy investigations	645,905	686,005	+ 40,100
Total	721,405	762,345	+ 40,940

(a) Includes \$3,500,000 appropriated for "Airways weather service and research" consolidated with this item in the 1941 Estimates.

(b) Transferred from A.A.A. funds in the amount of \$30,000.

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
BUREAU OF PLANT INDUSTRY:			
General administrative expenses	(a) \$209,942	\$211,982	+\$2,040
Arlington Farm	49,414	49,834	+ 420
Botany	76,635	76,995	+ 360
Cereal crops and diseases	551,121	501,040	- 50,081
Cotton and other fiber crops and diseases	424,385	401,500	- 22,885
Drug and related plants	47,139	43,700	- 3,439
Dry-land agriculture	226,828	175,720	- 51,108
Experimental greenhouse maintenance....	77,372	78,212	+ 840
Fertilizer investigations	(b) 225,000	240,525	+ 15,525
Forage crops and diseases	313,450	300,720	- 12,730
Forest pathology	265,392	230,760	- 34,632
Fruit and vegetable crops and diseases.	1,348,982	1,254,480	- 94,502
Genetics and biophysics	31,675	31,675	- -
Irrigation agriculture	152,674	125,120	- 27,554
Mycology and disease survey	45,818	46,998	+ 1,180
National Arboretum	54,587	54,587	- -
Nematology	48,961	49,161	+ 200
Plant exploration and introduction	(c) 247,682	225,353	- 22,329
Soil chemical and physical investigations	76,700	70,400	- 6,300
Soil fertility investigations	121,622	122,622	+ 1,000
Soil microbiology investigations	39,854	40,054	+ 200
Soil survey	298,708	275,900	- 22,808
Sugar-plant investigations	330,000	301,300	- 28,700
Tobacco investigations	(d) 151,568	141,204	- 10,364
Total	5,415,509	5,049,842	- 365,667
RELOCATION OF ARLINGTON EXPERIMENT FARM..	- -	500,000	+ 500,000

(a) Includes \$7,500 transferred from "General administrative expenses, Bureau of Agricultural Chemistry and Engineering" in connection with transfer of "Fertilizer investigations" (see Note b).

(b) Transferred in the 1941 Estimates from the Bureau of Agricultural Chemistry and Engineering.

(c) Includes \$46,749 appropriated under "Rubber and other tropical plants" consolidated with the above item in the 1941 Estimates.

(d) Includes \$16,024 appropriated under "Plant nutrition" consolidated with the above item in the 1941 Estimates.

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
FOREST SERVICE:			
General administrative expenses	\$607,500	\$602,000	-\$5,500
National forest protection and management	(a) 12,002,400	12,120,485	+ 118,085
Water rights	20,000	20,000	- -
Fighting forest fires	100,000	100,000	- -
Private forestry cooperation	100,000	100,000	- -
Forest management	(b) 643,403	607,900	- 35,503
Range investigations	245,935	230,900	- 15,035
Forest products	664,181	668,200	+ 4,019
Forest survey	250,000	250,000	- -
Forest economics	149,295	140,900	- 8,395
Forest influences	139,152	135,400	- 3,752
Total, salaries & expenses.	14,921,866	14,975,785	+ 53,919
Forest-fire cooperation	2,200,000	2,200,540	+ 540
New England hurricane damage	(c) - -	300,000	+ 300,000
Cooperative distribution of forest planting stock	100,000	100,000	- -
Acquisition of lands for national forests	3,000,000	1,000,900	- 1,999,100
Acquisition of lands from forest receipts	71,000	71,000	- -
Total, annual appropria- tions, General Account...	20,292,866	18,648,225	- 1,644,641
Payments to States and territories from the national forests fund	1,200,000	1,200,000	- -
Payments to school funds, Arizona and New Mexico, national forests fund ...	30,000	30,000	- -
Roads and trails for States, national forests fund	510,000	480,000	- 30,000
Cooperative work	1,000,000	1,000,000	- -
Total	23,032,866	21,358,225	- 1,674,641
FOREST ROADS AND TRAILS	10,000,000	10,000,000	- -

(a) Excludes \$1,600 transferred in the 1941 Estimates to the Office of the Solicitor.

(b) Includes \$30,000 appropriated under "Tropical forest experiment station" consolidated with the above item in the 1941 Estimates.

(c) An appropriation of \$5,000,000 made for this purpose in 1939, of which \$4,528,802 is available and estimated for obligation in 1940.

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
BUREAU OF AGRICULTURAL CHEMISTRY AND ENGINEERING:			
General administrative expenses	(a) \$105,300	\$105,500	+\$200
Agricultural chemical investigations ..	411,500	379,906	- 31,594
Industrial utilization of farm products and byproducts	(b) 189,600	120,300	- 69,300
Agricultural engineering investigations	349,469	349,669	+ 200
Naval-stores investigations	89,400	96,600	+ 7,200
Total	(c) 1,145,269	1,051,975	- 93,294
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE:			
General administrative expenses	166,280	166,900	+ 620
Fruit insects	428,600	416,124	- 12,476
Japanese beetle control	395,000	397,840	+ 2,840
Sweetpotato weevil control	75,000	70,400	- 4,600
Mexican fruitfly control	160,460	176,135	+ 15,675
Citrus canker eradication	13,485	13,905	+ 420
Gypsy and brown-tail moth control	375,000	379,640	+ 4,640
Dutch elm disease eradication	500,000	501,500	+ 1,500
Pheny peach and peach mosaic eradica- tion	89,800	91,520	+ 1,720
Forest insects	253,100	255,540	+ 2,440
Blister rust control	300,000	403,570	+ 103,570
Truck crop and garden insects	381,580	370,160	- 11,420
Cereal and forage insects	383,700	369,740	- 13,960
European corn borer control	32,939	28,239	- 4,700
Barberry eradication	175,000	176,460	+ 1,460
Cotton insects	144,544	145,524	+ 980
Pink bollworm and Thurberia weevil control	(d) 909,608	527,920	- 381,688
Bee culture	83,000	83,460	+ 460
Insects affecting man and animals	181,500	182,540	+ 1,040
Insect-post survey and identification .	154,790	155,730	+ 940
Foreign parasites	38,000	38,100	+ 100
Control investigations	67,518	67,778	+ 260
Insecticide and fungicide investiga- tions	134,984	136,174	+ 1,190
Transit inspection	44,059	44,559	+ 500
Foreign plant quarantines	680,000	683,080	+ 3,080
Certification of exports	31,862	31,862	- -
White-fringed beetle control	- -	603,600	+ 603,600
Total	6,199,809	6,518,000	+ 318,191

(a) Excludes \$7,500 transferred to "General administrative expenses, Bureau of Plant Industry" in connection with transfer of item "Fertilizer investigations" in the 1941 Estimates.

(b) Excludes \$1,600 transferred to Office of the Solicitor in the 1941 Estimates.

(c) Excludes \$225,000 for the item "Fertilizer investigations" transferred to the Bureau of Plant Industry in the 1941 Estimates.

(d) Includes \$2,808 for the item "Thurberia weevil control" consolidated with the above item in the 1941 Estimates.

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
BUREAU OF AGRICULTURAL ECONOMICS:			
General administrative expenses	\$88,900	\$89,275	+\$375
Economic investigations	839,100	838,725	- 375
Total	928,000	928,000	- -
AGRICULTURAL MARKETING SERVICE:			
General administrative expenses	157,306	158,636	+ 1,330
Marketing farm products	431,470	428,270	- 3,200
Crop and livestock estimates	747,510	730,850	- 16,660
Market inspection of farm products	459,000	480,000	+ 21,000
Tobacco Inspection and Tobacco Stocks and Standards Acts	(a) 442,187	442,187	- -
Market news service	1,138,302	1,136,090	- 2,212
Perishable Agricultural Commodities and Produce Agency Acts	155,000	153,130	- 1,870
Standard Container Acts	20,000	20,360	+ 360
Cotton quality statistics and classing Acts	475,000	465,000	- 10,000
United States Cotton Futures and United States Cotton Standards Acts..	495,000	492,060	- 2,940
United States Grain Standards Act	723,941	729,511	+ 5,570
United States Warehouse Act	417,500	451,000	+ 33,500
Federal Seed Act	52,293	94,072	+ 41,779
Packers and Stockyards Act	381,879	385,589	+ 3,710
Total, salaries & expenses.	6,096,388	6,166,755	+ 70,367
Farm products inspections	144,460	144,460	- -
Total	6,240,848	6,311,215	+ 70,367
BUREAU OF HOME ECONOMICS:			
General administrative expenses	31,735	31,855	+ 120
Home economics investigations	293,350	293,230	- 120
Total	325,085	325,085	- -
ENFORCEMENT OF THE COMMODITY EXCHANGE ACT	623,380	623,380	- -

(a) Includes \$17,187 appropriated under "Tobacco stocks and standards" consolidated with the above item in the 1941 Estimates.

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
FOOD AND DRUG ADMINISTRATION:			
General administrative expenses	100,802	101,402	+\$600
Enforcement of the Federal Food, Drug, and Cosmetic Act	(a) 2,254,580	2,503,980	+ 249,400
Enforcement of the Tea Importation Act.	30,094	30,214	+ 120
Naval Stores Act	34,700	34,800	+ 100
Enforcement of the Insecticide Act	193,180	194,020	+ 840
Enforcement of the Milk Importation Act	19,241	19,241	- -
Enforcement of the Caustic Poison Act..	24,741	24,741	- -
Enforcement of the Filled Milk Act	10,000	10,000	- -
Enforcement of the Sea Food Inspectors Act	40,000	41,260	+ 1,260
Total, salaries & expenses.	2,707,338	2,959,658	+ 252,320
Sea Food Inspections (trust account) ..	29,000	29,000	- -
Total	2,736,338	2,988,658	+ 252,320
SOIL CONSERVATION SERVICE:			
General administrative expenses	552,050	553,138	+ 1,088
Soil and moisture conservation and land-use investigations	1,631,185	1,506,960	- 124,225
Soil and moisture conservation and land use operations, demonstrations, and information	21,462,349	18,059,722	- 3,402,627
Emergency erosion control, Everglades region, Florida	75,000	75,308	+ 308
Total	23,720,584	20,195,128	- 3,525,456
CONSERVATION AND USE OF AGRICULTURAL LAND RESOURCES:			
Direct appropriation	429,560,000	498,560,000	+ 69,000,000
Reappropriation	70,000,000	- -	- 70,000,000
Total	499,560,000	498,560,000	- 1,000,000
PARITY PAYMENTS	225,000,000	- -	-225,000,000
COMMODITY CREDIT CORPORATION	(b)	(b)	(b)
DISPOSAL OF SURPLUS COMMODITIES:			
Permanent appropriation, Sec. 32	92,678,812	92,678,812	- -
Annual appropriation	113,000,000	80,000,000	- 33,000,000
Total	205,678,812	172,678,812	- 33,000,000

(a) Excludes \$33,800 transferred to Office of the Solicitor in the 1941 Estimates.

(b) \$119,599,918 for restoration of the capital impairment of the Commodity Credit Corporation as of March 31, 1939, provided in Third Deficiency Appropriation Act, fiscal year 1939 (Treasury Department appropriation).

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
SUGAR ACT OF 1937:			
Direct appropriation	\$31,975,000	\$47,975,000	+\$16,000,000
Reappropriation	16,000,000	- -	- 16,000,000
Total	47,975,000	47,975,000	- -
FEDERAL CROP INSURANCE ACT:			
Direct appropriation	5,423,200	5,428,928	+ 5,728
Reappropriation	500,000	100,000	- 400,000
Total	5,923,200	5,528,928	- 394,272
FARM TENANT ACT:			
Farm tenancy:			
Direct appropriation	40,000,000	25,000,000	- 15,000,000
Reappropriation	775,000	(a)	- 775,000
Liquidation and management of resettlement projects	1,987,400	1,500,000	- 487,400
Land utilization and retirement of submarginal lands:			
Direct appropriation	4,978,330	1,102,500	- 3,875,830
Reappropriation	2,445,000	(a)	- 2,445,000
Total	50,185,730	27,602,500	- 22,583,230
(b)			
LOANS, RELIEF, AND RURAL REHABILITATION:	(b)		
Direct appropriation	143,000,000	(b)	(b)
Reappropriation	18,450,000	(b)	(b)
Total	161,450,000	(b)	(b)
FARM SECURITY ADMINISTRATION:			
Payments in lieu of taxes and for operation and maintenance of resettlement projects	1,800,000	2,000,000	+ 200,000
State Rural Rehabilitation Corporation Funds	2,875,000	2,250,000	- 625,000
Total	4,675,000	4,250,000	- 425,000
WATER FACILITIES, ARID AND SEMI-ARID AREAS	500,000	500,000	- -
COOPERATIVE FARM FORESTRY	300,000	300,756	+ 756

(a) Unobligated balances from 1940, if any, to be available for 1941.

(b) This item provided in 1940 by the Emergency Relief Appropriation Act of 1939, and is to be considered in connection with emergency relief appropriation for 1941. The 1940 totals in this table exclude this item.

Bureau and Item	Appropriation 1940	Budget Estimate, 1941	Increase or Decrease, 1941
RURAL ELECTRIFICATION:			
Salaries and expenses	\$2,700,000	\$3,100,000	+\$400,000
Printing and binding	90,000	100,000	+ 10,000
Loans	40,000,000	(a)- -	(a)-40,000,000
Total	42,790,000	(a)3,200,000	(a)-39,590,000
BELTSVILLE RESEARCH CENTER	85,000	109,450	+ 24,450
FLOOD CONTROL (transfer from War Dept.)..	(b) 3,000,000	(b)	(b)
MISCELLANEOUS CONTRIBUTED FUNDS	99,000	78,500	- 20,500
Total appropriations and reappropriations, exclusive of Farm Credit Administration	(c) 1,222,307,302	893,143,583	-329,163,719
Deduct reappropriations included in foregoing:			
Eradicating tuberculosis and Bang's disease (Animal Industry)	- 4,000,000	- 4,000,000	- -
Control of European fowl pest (Animal Industry)	- 5,000	- 5,000	- -
Conservation and use of agricultural land resources	- 70,000,000	- -	+ 70,000,000
Sugar Act of 1937	- 16,000,000	- -	+ 16,000,000
Federal Crop Insurance Act	- 500,000	- 100,000	+ 400,000
Farm Tenant Act:			
Title I (tenancy loans)	- 775,000	- -	+ 775,000
Title III (submarginal land program).	- 2,445,000	- -	+ 2,445,000
Total, deductions, as above	- 93,725,000	- 4,105,000	+ 89,620,000
Total, Direct appropriations, foregoing items	(d) 1,128,582,302	889,038,583	-239,543,719

(a) Rural electrification loans to be financed in 1941 by transfer from Reconstruction Finance Corporation.

(b) Provided for 1940 by War Department Civil Appropriation Act. Not included in 1940 totals in this table, since Budget Estimate for 1941 not available at this date (November 30, 1939).

(c) Exclusive of \$161,450,000 for Loans, Relief, and Rural Rehabilitation, and \$3,000,000 for Flood Control.

(d) Exclusive of \$143,000,000 for Loans, Relief, and Rural Rehabilitation, and \$3,000,000 for Flood Control.

OFFICE OF THE SECRETARY

(a) SALARIES, OFFICE OF THE SECRETARY

Appropriation Act, 1940.....	\$581,920
Transfers pursuant to Reorganization Plans Nos. I and II:	
To "Salaries, Office of the Secretary of the Interior"..	-5,900
From "Salaries and expenses, Farm Credit Administration".	+21,600
From "Salaries and administrative expenses, Commodity Credit Corporation".....	+20,590
Total available, 1940.....	618,210
Budget Estimate, 1941.....	597,620
Decrease.....	<u>-20,590</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Decrease
1. <u>General administration</u> (including offices of the Secretary, Under Secretary, and Assistant Secretary).....	\$84,193	\$ 87,180	\$ 87,180	---
2. <u>Personnel administration and service</u> (including divisions of appointment records, classification, qualifications, training, organization and planning, investigations, and personnel relations, safety and health)....	135,180	136,590	129,240	\$-7,350(1)
3. <u>Budget and finance administration and service</u> (including divisions of accounts, estimates and allotments, fiscal management, purchase, sales and traffic, and bureau accounting service).....	204,181	199,700	189,880	-9,820(1)
4. <u>General operations</u> (including divisions of communications, real estate, administrative services, property records and statistics, motor transport, and technical advisory board).....	119,755	117,440	114,020	-3,420(1)
5. <u>Land-use coordination</u> (departmental administrative coordination of all land-use programs, including soil conservation, erosion control, rural rehabilitation, flood control, land utilization and purchase, submarginal land, water facilities in the arid and semi-arid states, and related programs).....	59,660	68,300	68,300	---

PROJECT STATEMENT (Continued)

Projects	1939	1940 (Estimated)	1941 (Estimated)	Decrease
Reimbursement to Federal Works Agency for guarding rented quarters in Washington, D. C.....	6,433	9,000	9,000	-----
Unobligated balance.....	8,808	-----	-----	-----
Total appropriation.....	(a)618,210	(a)618,210	597,620	:-20,590(1)

- (a) Includes \$21,600 transferred in 1940 under authority of the Reorganization Act, from "Salaries and expenses, Farm Credit Administration" and \$20,590 from "Salaries and administrative expenses, Commodity Credit Corporation," and excludes \$5,900 transferred to "Salaries, Office of the Secretary of the Interior."

DECREASE

(1) The reduction of \$20,590 indicated under this item is an apparent decrease, since that amount, which is a transfer to this appropriation for 1940 pursuant to Reorganization Plan No. I from the appropriation for "Salaries and Administrative Expenses, Commodity Credit Corporation," under the Budget estimates will be made available by allotment to the Office of the Secretary from funds available to the Corporation during 1941.

WORK UNDER THIS APPROPRIATION

General.--This appropriation provides for salaries of employees of the Office of the Secretary of Agriculture, Under Secretary, Assistant Secretary, Office of Personnel, Office of Budget and Finance, Office of Land Use Coordination, and Office of Plant and Operations, including such activities as land-use coordination, the appointment, salary classification, personnel relations, safety and health, qualification and training, and investigations divisions, the finance, accounting, fiscal management, purchases, sales and traffic divisions, the communications, administrative services, real estate and housing, motor transport, technical advisory, and property records divisions, etc. necessary for the general administration and supervision of the work of the Department. This organization is supplemented by employees paid by allotments of funds, as shown on page 26, from appropriations for activities that require personnel, fiscal, accounting, general administrative, coordinating, and related departmental services.

1. General Administration.-- The Offices of the Secretary, the Under Secretary, and the Assistant Secretary, exercise general supervision and control over the Department as a whole, and formulate, establish, and arrange for the carrying out of policies affecting agriculture in its broadest sense.

2. Personnel Administration and Service.--The Office of Personnel is in charge of the personnel work of the Department. This office unifies methods of procedure and applications of policy in regard to personnel; advises with the several bureaus and offices on organization, job classification, placement, training, and procedure; maintains records, renders reports, and makes all contacts with other Government agencies on matters relating to personnel; investigates cases of delinquency among employees and recommends appropriate disciplinary action; interprets the regulations applying to leave and efficiency ratings; reviews proposed changes affecting the status of employees and recommends appropriate action to the Secretary; provides emergency-room facilities; organizes and develops programs of safety education and elimination of accident hazards; and sponsors and promotes educational courses for employees, welfare activities, and other measures which may contribute to improve the general morale of the Department.

3. Budget and Finance Administration and Service.--The Office of Budget and Finance has general supervision over the fiscal business of the Department. It prepares, in cooperation with the bureaus, the annual budget for the Department; prepares reports on appropriations and expenditures; consults and advises with the bureaus on fiscal matters; operates a fiscal examining service; maintains the uniform project system covering the program of work of the Department, and appropriation control and related accounts for the Department as a whole; maintains a bureau accounting service for certain of the bureaus which do not maintain bureau accounting offices; and supervises and coordinates activities involving purchases, sales, and traffic within the Department. This office conducts the business of the Department with the Bureau of the Budget, the General Accounting Office, the Treasury Department, the Appropriations Committees, and other agencies of the Government concerned with fiscal and related matters.

4. General Operations.--The Office of Plant and Operations is responsible for the housing of the operating plant of the department for Washington and the field, including space control and assignment, leasing, long-range planning and other pertinent activities. It is responsible for the technical coordination and standardization of matters pertaining to equipment and services for the Department where engineering principles are involved. It manages the communication services of the Department, including mail and files, post office, telephone and telegraph, and is responsible for the development, in collaboration with the bureaus, of a uniform system of file operations. This office performs the general administrative functions for the Office of the Secretary, such as the preparation of budget estimates and justifications and subsequent budgetary control, the performance of all actions incident to personnel management and control and the maintenance of pertinent records, and the handling of requisitions

for supplies, equipment, and services; maintains property records, and operates a motor transport service including an automotive maintenance garage. It also is responsible for the departmental service and management functions incident to the operation of the Beltsville Research Center. This office conducts the business of the Department with the Federal Works Agency, the National Archives, and the Post Office Department.

5. Land-Use Coordination.--The Office of Land Use Coordination directs the administrative coordination of land policy, water policy, and land-survey activities as they relate to the work of the Department as a whole, including (1) correlation of existing action programs that affect land use, (2) clearance of land acquisition projects, (3) general supervision of the water-facilities program which is administered by three participating bureaus, (4) establishment of uniform standards for all survey work relating to land use, and clearance and coordination of proposed survey projects, (5) interdepartmental coordination in cooperation with the National Resources Planning Board, Department of the Interior, and other agencies, (6) cooperation with the Director of Research and chiefs of bureaus in coordinating land-use research with the land-use action programs, and (7) cooperation with the Agricultural Program Board and the heads of action agencies in coordinating basic land-use policies and programs.

QUARTERS, HEAT, AND LIGHT ALLOWANCE AUTHORIZATIONS FOR 1941.

A decrease from \$54,000 to \$25,000 is recommended in the amount of the proviso contained in the appropriation for "Salaries, Office of the Secretary" which limits the total that may be paid from the several bureau appropriations applicable as allowances to officers and employees of the Department of Agriculture permanently stationed in foreign countries for living quarters, including heat, fuel, and light, under the provisions of the Act of June 26, 1930 (5 U.S.C. 118a).

The estimated allocations to the bureaus involved on a per annum basis, for the fiscal years 1940 and 1941, are as follows:

	<u>F.Y. 1940</u>	<u>F.Y. 1941</u>
Office of Foreign Agricultural Relations.....	\$8,300	\$8,300
Foreign Agricultural Service (transferred to Department of State in 1940).....	29,900	---
Bureau of Animal Industry.....	1,400	1,400
Bureau of Entomology and Plant Quarantine.....	9,360	9,420
Departmental reserve authority for contingencies	<u>5,040</u>	<u>5,880</u>
Total.....	54,000	25,000

The recommended decrease of \$29,000 in the amount of this proviso contemplates the following adjustments:

Decrease due to transfer of Foreign Agricultural Service employees to Department of State pursuant to the provisions of the Reorganization Act of 1939 and Reorganization Plan No. II.....	-29,900
Increase from \$660 to \$720 in allowance of one junior entomologist stationed at Mexico City, Mexico.....	+ 60
Increase in amount available for departmental reserve to provide for possible changes in assignment and/or classification of posts and for other unforeseen contingencies during the year.....	<u>+ 840</u>
Net decrease.....	- 29,000

Because of emergency conditions existing in Europe, it may not be necessary to utilize this authority in European countries, as indicated in the accompanying schedules. However, in that event, it is contemplated that the Department's representatives will be given other assignments, probably in Latin America. Certain legal complications may also restrict the use of a portion of these funds, but the amount indicated represents the Department's most accurate estimate of the funds required for operations under normal circumstances.

A detailed schedule of the allowance amounts for 1939 and the estimated amounts for 1940 and 1941 follows:

Appropriation and subappropriation	Title of position	Post of duty	Classification of post	Domestic	Group	Salary	Estimated 1941	Estimated 1940	Actual, 1939
Bureau of Entomology and Plant Quarantine:									
Salaries and expenses:									
Fruit Insects	Prin. Entomologist	Mexico City, Mexico	V	M	2	\$0,600	\$720:	\$720:	\$720
	Senior Entomologist	" "	V	M	3	4,600:	720:	720:	720
	Assoc. Entomologist	" "	V	M	3	3,200:	720:	720:	720
	Assoc. Chemist	" "	V	M	3	3,200:	720:	720:	720
	Jr. Entomologist	" "	V	M	3	2,000:	720:	660:	385
	Asst. Entomologist	Hacienda Santa Engracia, Mexico	II	M	3	2,600:	660:	660:	705
Forest Insects	Assoc. Entomologist	Oxford, England	III	M	2	3,200:	---	---	180
Foreign Parasites ...	Assoc. Entomologist	Yokohama, Japan	IV	S	2	3,200:	1,020:	1,020:	1,020
	Asst. Entomologist	" "	IV	S	3	2,600:	900:	900:	900
	Entomologist	St. Cloud, France	V	M	2	4,600:	1,200:	1,200:	1,200
	Assoc. Entomologist	" "	V	M	3	3,200:	1,020:	1,020:	1,020
	Asst. Entomologist	" "	V	M	3	2,600:	1,020:	1,020:	425
Total, Bureau of Entomology and Plant Quarantine						41,000:	9,420:	9,360:	8,715
Bureau of Plant Industry:									
Salaries and expenses:									
Forest Pathology	Assoc. Pathologist	Oxford, England	III	M	2	3,200:	---	---	101

Appropriation and subappropriation	Title of position	Post of duty	Classification of post	Domestic station	Group	Salary: Estimated, 1941-1944	Salary: Actual, 1939	Allowances
Office of Foreign Agricultural Relations:								
Salaries and expenses:								
Principal Marketing Specialist	Principal Marketing Specialist	London, England	V	M	2	\$6,000:\$1,600:\$1,600	\$1,600	\$1,600
Principal Marketing Specialist	Principal Marketing Specialist	Manchester, England	IV	M	2	6,000: 1,500: 1,500	1,500	1,500
Senior Marketing Specialist	Senior Marketing Specialist	Paris, France	V	M	2	3,800: 1,400: 1,400	1,400	1,200
Senior Marketing Specialist	Senior Marketing Specialist	Unassigned	V	M	2	4,800: 1,600: 1,600	1,600	1,600
Senior Marketing Specialist	Senior Marketing Specialist	Unassigned	V	M	2	4,800: 1,600: 1,600	1,600	1,000
Technical Assistant	Technical Assistant	London, England	V	S	4	2,000: 600: 600	600	300
Agricultural Economist	Agricultural Economist	Berlin, Germany	V	M	3	4,200: ---: ---	---	1,500
Total, Office of Foreign Agricultural Relations						31,600: 8,300: 8,300	8,300	8,700
Bureau of Animal Industry:								
Salaries and expenses: Inspection and Quarantine	Senior Veterinarian	London, England	V	M	2	4,600: 1,400: 1,400	1,400	1,400
Grand Total						80,400:19,120:19,060	18,916	

(b) MISCELLANEOUS EXPENSES, DEPARTMENT OF AGRICULTURE

Appropriation Act, 1940.....	\$108,250
Transfer pursuant to Reorganization Plans Nos. I and II:	
To "Contingent expenses, Department of the Interior"...	-500
From "Salaries and administrative expenses, Commodity Credit Corporation".....	+1,360
Total available, 1940.....	109,110
Budget Estimate, 1941.....	105,000
Decrease.....	<u>4,110</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Decrease
Miscellaneous Expenses, Department of Agriculture.....	\$101,052	\$109,110	\$105,000	\$-4,110(1)
Unobligated balance.....	8,058	-----	-----	---
Total appropriation.....	(a)109,110	(a)109,110	105,000	-4,110

- (a) Includes \$1,360 transferred 1940 under Reorganization Act from "Salaries and administrative expenses, Commodity Credit Corporation" and excludes \$500 transferred to "Contingent expenses, Department of the Interior."

DECREASE

(1) An apparent decrease of \$4,110 but an actual decrease of \$2,750 is indicated for this item for 1941, as follows:

(a) Apparent decrease of \$1,360, which is a transfer to this appropriation for 1940 pursuant to Reorganization Plan No. I from the appropriation for "Salaries and Administrative Expenses, Commodity Credit Corporation." Under the Budget estimates this amount will be made available by allotment to the Office of the Secretary from funds available to the Corporation during 1941.

(b) Actual decrease of \$2,750, which will be met by reductions in expenditures for office supplies and materials and in the purchase or replacement of equipment, together with minor savings in other items.

CHANGE IN AUTHORIZATION FOR PASSENGER-CARRYING VEHICLES

The authorization under the appropriation for "Miscellaneous Expenses, Department of Agriculture" for the purchase and exchange of one passenger-carrying vehicle has been increased from \$1,500 (as provided in the 1940 Act) to \$1,800 in 1941, in order to permit the replacement during that fiscal year of the automobile provided for the use of the Secretary of Agriculture. At the time of its proposed replacement during the fiscal year 1941, this automobile will have been in continuous service for three years, and in the interest of economical operation its replacement at that time is indicated. No additional funds are involved in this item.

WORK UNDER THIS APPROPRIATION

This appropriation, as indicated by its terms, provides for a great variety of miscellaneous objects and services necessary in the conduct of the work of the Department, including stationery, supplies, materials, and equipment, communication service, postage, freight, express, and drayage charges, laundry, repairs and alterations, advertising and press clippings, travel expenses, maintenance and operation of motor vehicles, and miscellaneous supplies and expenses not otherwise provided for and necessary for the practical and efficient work of the Department. It provides, also, for the compensation of the personnel of the Motor Transport Service and of such personnel of the Central Supply Section as may be engaged in the procurement, storage, issue, and shipment of supplies and materials for the several bureaus of the Department, reimbursement being made to this appropriation from the funds of the bureaus for which service is rendered.

(c) RENT OF BUILDINGS IN THE DISTRICT OF COLUMBIA

Appropriation Act, 1940.....	\$193,600
Transferred, under the Reorganization Act, to "Rent of buildings, Biological Survey, Department of the Interior"..	-2,523
Total available, 1940.....	191,077
Budget Estimate, 1941.....	165,502
Decrease.....	<u>25,575</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Decrease
Rent of buildings in the District: of Columbia.....	:(a)\$182,059	\$191,077	\$165,502	-\$25,575(1)
Unobligated balance.....	6,217	-----	-----	-----
Total appropriation.....	:(a)188,276	191,077	165,502	-25,575

(a) 1939 obligations exclude \$2,523 transferred in 1940 to "Rent of Buildings, Biological Survey, Department of the Interior," and include allotments from the following appropriation items under authorization contained in the Second Deficiency Act, Fiscal Year 1938 (Public No. 723, 75th Congress):

"Salaries and Expenses, Soil Conservation Service, Soil and Moisture Conservation Operations, Demonstrations, and Information".....	\$4,724
"Federal Aid, Wildlife Restoration, Department of Agriculture (Receipt Limitation)".....	1,800
"National Industrial Recovery, Agriculture, Wildlife Refuges, (Biological Survey)".....	700
"Salaries and Expenses, Weather Bureau, Aerology".....	2,920
	<u>10,144</u>

DECREASE

(1) A decrease of \$25,575 is submitted in this item incident to the removal during the fiscal year 1941 of certain units of the Department to quarters now under construction at the Beltsville (Md.) Research Center, as follows:

(a) Decrease of \$3,700 in anticipation of the relinquishment of rented quarters occupied by the Fixed Nitrogen Research Laboratory of the Bureau of Agricultural Chemistry and Engineering. Present plans contemplate the removal, during the fiscal year 1941, of the Fixed Nitrogen Research Laboratory from its present rented quarters in the McKinley Building, American University, to newly-constructed quarters at the Beltsville (Md.) Research Center. If moving operations can be accomplished by March 31, 1941, a reduction of \$3,700 can be effected in this appropriation item for 1941. While it is anticipated that the new structure at Beltsville will be ready for occupancy and moving operations completed by March 31, 1941, should unforeseen circumstances delay occupancy beyond that date, it may be necessary later to request a supplemental amount to cover an additional period of occupancy of the present rented quarters.

(b) Decrease of \$21,875 in connection with the removal of certain laboratory units of the Bureau of Home Economics from the Department's South Building to the newly-constructed quarters at the Beltsville (Md.) Research Center. The units of the Bureau of Home Economics which will be moved to the Beltsville Center now occupy approximately 16,814 square feet of floor space in the South Building. Upon the removal of these units to Beltsville, it will be possible to move into the South Building space, thus vacated, departmental activities now housed elsewhere. The estimate contemplates that such moves will result in the relinquishing of space now rented under this appropriation in the sum of \$21,875. However, if unforeseen delays in the building program necessitate the retention of the present rented quarters beyond the close of the current fiscal year (1940), it may later be necessary to request a supplemental amount to cover the additional period of such occupancy.

WORK UNDER THIS APPROPRIATION

This appropriation provides funds for the rental of office, laboratory, and storage facilities for regular activities of the Department in the District of Columbia for which no quarters are available in Government-owned structures. The following statements show the buildings and parts of buildings in Washington leased under this appropriation and under other funds of the Department.

Statement Showing Estimated Rentals, Fiscal Years 1941, 1940, and 1939.

Building and Location	Bureau Occupying Space	Tentative Estimate F.Y. 1941	Estimated F.Y. 1940	Actual F.Y. 1939
Standard Oil (261 Const'n Ave. N.W.).....	Soil Conservation Service.....	\$70,652	\$70,652	\$68,984
Atlantic (923-930 F Street, N. W.).....	Forest Service.....	30,000	30,000	30,000
Victor (724 9th St., N. W.).....	Forest Service.....	14,490	14,490	14,490
Printcraft (930 H St., N. W.).....	Soil Conservation Service.....	20,560	20,560	20,560
Columbian (426 5th St., N. W.).....	Soil Conservation Service.....	-----	17,321	17,598
2214 H St., N. W.	Weather Bureau.....	6,960	6,960	-----
Hamilton Nat'l Bank (1200-02 Wisc. Ave.)..	Weather Bureau.....	6,150	6,150	2,562
Stewart (6th and D Sts., N. W.).....	Soil Conservation Service.....	2,438	2,438	2,011
1214 24th St., N. W.	Weather Bureau.....	1,920	1,920	1,920
913-915 G Place, N. W.	Soil Conservation Service.....	-----	1,652	-----
2513 H St., N. W.	Weather Bureau.....	1,000	1,000	1,000
McKinley (American University).....	Agr'l Chemistry & Engineering	11,100	14,800	14,800
Rizik (1737 L St., N. W.).....	Soil Con.Svc.& Weather Bur. .	-----	-----	4,181
McGill (908 G St., N. W.).....	Biological Survey.....	-----	-----	3,028
1653 Pennsylvania Ave., N. W.	Soil Conservation Service.....	-----	-----	925
Reserve for emergency rentals and reconditioning of rented quarters upon relinquishment		232 165,502	3,124 191,077	8,740 190,799
Deduct rentals included above transferred in 1939 from other appropriations under authorization in Second Deficiency Act, 1938.....		-----	-----	-10,144
Add rental not included above transferred to Department of Interior pursuant to provisions of the Reorganization Act of 1939 and Reorganization Plan No. II.....		-----	+2,523 193,600	----- 180,655
Net "Rent of Buildings" appropriation.....		165,502		

Statement showing buildings and parts of buildings rented in the District of Columbia other than those estimated for under the appropriation for "Rent of Buildings in the District of Columbia"

(as of December 1, 1939)

Building and Location	Bureau Occupying Space and Fund From Which Paid	Annual Rental Rate
Courts (310-312 6th St., N.W.)	Agr'l Adjust. Admin. (Emergency Relief, W.P.A.)	\$6,600
400-402 11th St., S.W.	Agr'l Chem. & Engineering (Cons. & Use, New Uses and Markets)	6,365
1825 H St., N.W.	Commodity Credit Corp'n. (Administrative Expenses)	6,195
1420 U St., N.W.	do.	494
Barr (910 17th St., N.W.)	Farm Security Admin. (Emergency Relief; Farm Tenancy; Liquidation and Management of Resettlement Projects)	49,346
City Club (1320 G St., N.W.)	do.	43,990
501-513 26th St., N.W.	do.	6,300
517 26th St., N.W.	do.	1,800
1326 New York Ave., N.W.	Federal Crop Insurance Corp'n. (Crop Insurance Act)	12,000
Victor (724 9th St., N.W.)	Forest Service (Civilian Conservation Corps)	10,635 (a)
920 F St., N.W.	do.	600
3209 Highland Place, N.W.	Home Economics (Special Research Fund)	1
Investment (15th & K Sts., N.W.)	Rural Electrification Admin. (Salaries and Expenses)	30,858
1437 K St., N.W.	do.	15,000
2000 Massachusetts Ave., N.W.	do.	15,000
1518 K St., N.W.	do.	16,995
1022 15th St., N.W.	do.	9,075
1730 L St., N.W.	do.	3,480
2005 P St., N.W.	do.	1,350
1420 U St., N.W.	do.	1,597
Standard Oil (261 Const. Ave. N.W.)	Soil Conservation Service (Land Utilization)	18,713 (a)
Stewart (6th and D Sts., N.W.)	Soil Conservation Service (Flood Control)	1,226 (a)
1047 31st St., N.W.	Weather (W.P.A. Project)	1,560
Washington (15th & N.Y. Av., N.W.)	Solicitor (Emergency Relief)	3,225
Total		262,405

(a) Balance of rent paid from appropriation for "Rent of buildings in the District of Columbia."

For administrative, fiscal, accounting, personnel, investigative, and other departmental services and expenses, including coordination of land use activities.

Projects	Obligated 1939	Estimated obligations, 1940	Estimated obligations, 1941
Special Research Fund.....	\$ 1,860	\$ 1,860	\$ 1,920
Conservation and Use of Agricultural Land Resources.....	321,496	380,425	380,425
Conservation and Use of Agricultural Land Resources (Regional Research Laboratories).....	-----	4,000	4,000
Salaries and Expenses, Agricultural Adjustment Administration.....	14,763	75,000	75,000
Administration of Sugar Act of 1937.....	15,293	20,500	20,500
Exportation and Domestic Consumption of Agricultural Commodities.....	53,360	57,500	51,500
Farm Tenancy, Department of Agri- culture.....	9,475	20,000	12,000
Liquidation and Management of Resettle- ment Projects.....	6,034	10,000	7,500
Land Utilization and Retirement of Sub- marginal Land.....	32,275	49,175	14,300
Administration of Federal Crop Insurance Act.....	27,745	42,500	41,000
Flood Control, General (Transfer to Agriculture).....	27,027	63,360	(a)
Development of Water Facilities, Arid and Semi-Arid Areas.....	1,291	5,000	5,000
Enforcement of Commodity Exchange Act.....	434	2,500	2,500
Salaries and Administrative Expenses, Commodity Credit Corporation.....	-----	(b)	21,950
Salaries and Expenses, Rural Electrifi- cation.....	-----	45,000	45,000
Emergency Relief Appropriation Act.....	131,720	173,309	(a)
Emergency Relief Act (Transfer from W.P.A.).....	8,075	10,000	(a)
Total, Supplemental Funds.....	650,848	960,129	682,595
Civilian Conservation Corps (Act of June 28, 1937, and supplemented acts; indirect allotment, through War Depart- ment).....	17,424	56,470	(a)

(a) 1941 Budget estimates for Flood Control, Emergency Relief, and Civilian Conservation Corps not yet available.

(b) Allotment for 1940 covered by transfer under Reorganization Plan No. I, of \$20,590 to the appropriation "Salaries, Office of the Secretary" and \$1,360 to "Miscellaneous Expenses, Department of Agriculture."

OFFICE OF THE SOLICITOR

(a) SALARIES AND EXPENSES

Appropriation Act, 1940	\$232,480
Transferred to Interior Department, pursuant to provisions of Reorganization Plan No. II. . . .	1,200 (1)
Allotments from:	
"Enforcement of the Federal Food, Drug, and Cosmetic Act", Food and Drug Administration .	33,800 (2)
"National Forest Protection and Management", Forest Service	1,600 (2)
"Industrial Utilization of Farm Products and Byproducts", Bureau of Agricultural Chemistry and Engineering	1,600 (2)
Available, 1940	268,280
Budget estimate, 1941	269,000
Increase	720

(1) Transferred to Interior Department incident to the transfer of the Biological Survey under Reorganization Plan No. II.

(2) These allotments cover salaries of employees engaged in legal work in the Solicitor's Office for the Food and Drug Administration, the Forest Service, and the Bureau of Agricultural Chemistry and Engineering who are transferred to this item in the estimates for 1941, with corresponding reduction in the appropriations specified in each case.

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
Legal advice and assistance	\$240,969	\$268,280	\$269,000	+ \$720(1)
Unobligated balance.	742	---	---	---
Total	(a) \$241,711	(b) \$268,280	\$269,000	+ \$720(1)

- (a) 1939 obligations include allotments of \$7,173 from "Enforcement of the Food Drug and Cosmetic Act", Food and Drug Administration, \$1,200 from "National Forest Protection and Management", Forest Service, and \$1,600 from "Industrial Utilization of Farm Products and Byproducts", Bureau of Agricultural Chemistry and Engineering.
- (b) 1940 obligations include \$37,000 covering salaries as explained under (2) above, transferred to this item in the estimates for 1941, with corresponding reduction in the appropriations involved.

INCREASE

- (1) The increase of \$720 represents the additional amount estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

The Office of the Solicitor is the law office of the Department, in compliance with a statute providing that "the legal work of the Department of Agriculture shall be performed under the supervision and direction of the Solicitor" (5 U.S.C.A., sec. 518). Among the duties performed by the Office are: advising the Secretary and other administrative officials on legal problems in connection with all phases of their duties; assisting in the preparation of proposed administrative rules and regulations, orders, proclamations and legislative bills; rendering to the Secretary and to other officials of the Department legal opinions construing and applying statutes, Executive orders, and administrative rules and regulations; drafting, examining, and construing contracts, deeds, mortgages, leases, and other documents; approving the organization of cooperative associations, soil conservation districts, and similar agencies and their eligibility for participation in departmental programs; examining evidence to determine whether there have been violations of acts administered by the Department and, in proper cases, recommending prosecution to the Attorney General; preparing pleadings and briefs in civil and criminal cases involving the Department and the laws administered by it, and cooperating with the Department of Justice in the handling of such litigation in the lower and appellate courts; representing the Department as counsel in hearings before the Secretary; handling the contacts of the Department with other governmental agencies, State and Federal, in legal matters; conducting administrative hearings, and issuing tentative findings, conclusions, and orders with respect thereto, under various acts administered by the Department; prosecuting applications for patents by Department employees where the subject of the patent is used in departmental work; examining titles to land authorized for purchase or on which loans will be made by the Department; considering and recommending appropriate disposal of claims for damage to property of the United States in the custody of the Department and claims against the Government for damage arising from operations of the Department.

SUPPLEMENTAL FUNDS

Projects	Obligated, 1939	Estimated obligations, 1940	Estimated obligations, 1941
<u>Agricultural Adjustment Administration:</u>			
(transferred to Office of the			
Solicitor); Salaries and Expenses:			
Legal work relating to Agricultural			
Adjustment Administration projects..	\$137,017	\$164,300	\$164,300
<u>Exportation and Domestic Consumption</u>			
<u>of Agricultural Commodities:</u> Legal			
work in connection with the admin-			
istration of Section 32 of the Act			
of August 24, 1935	42,367	46,420	42,000
<u>Conservation and Use of Agricultural</u>			
<u>Land Resources:</u> Legal work in con-			
nection with the agricultural con-			
servation program of the Agricul-			
tural Adjustment Administration.....	124,126	126,580	126,580
<u>Conservation and Use of Agricultural</u>			
<u>Land Resources:</u> Legal work in con-			
nection with the adjustment in			
freight rates for farm products	11,731	14,500	14,500
<u>Price Adjustment Act of 1938:</u>			
Legal work in connection with the			
administration of the Price Adjust-			
ment Act of 1938	- -	15,000	- -
<u>Parity Payments:</u> Legal work in con-			
nection with the administration of			
the Parity Payments program	- -	- -	15,355
<u>Sugar Act of 1937:</u> Legal work in con-			
nection with the Sugar Act of 1937..	30,068	47,790	47,790
<u>Federal Crop Insurance Act:</u> Legal			
work in connection with the Federal			
Crop Insurance Act	48,786	58,690	46,690
<u>Acquisition of Lands for Protection of</u>			
<u>Watersheds of Navigable Streams:</u>			
Legal work in connection with the			
acquisition of lands for protec-			
tion of watersheds of navigable			
streams	116,605	120,000	60,000

SUPPLEMENTAL FUNDS - Continued

Projects	Obligated, 1939	Estimated obligations, 1940	Estimated obligations, 1941
<u>Land Utilization and Retirement of</u>			
<u>Submarginal Land:</u> Legal work in con-			
nection with the land utilization			
and retirement of submarginal land			
program	\$187,857	\$260,000	\$90,000
<u>Farm Tenancy:</u> Legal work in connec-			
tion with the administration of			
Title I of the Farm Tenant Act	92,828	140,000	100,000
<u>Liquidation and Management of Resettle-</u>			
<u>ment Projects:</u> Legal work in con-			
nection with section 43 of the Farm			
Tenant Act relating to resettlement			
projects and rural rehabilitation			
projects for resettlement purposes..	71,881	75,000	56,250
<u>Flood Control, General:</u> Legal work in;			
connection with the flood control			
program	6,108	6,859	(a)
<u>National Industrial Recovery, Agricul-</u>			
<u>ture, Wildlife Refuges:</u> Legal work			
in connection with the acquisition			
of lands for migratory bird refuges.	13,381	- -	- -
<u>Emergency Relief Appropriation Acts:</u>			
Legal work in connection with the			
Farm Security Administration pro-			
grams.....	339,001	397,885	(a)
<u>Emergency Relief Appropriation Act of</u>			
<u>1935:</u> Legal work in connection with:			
land acquisition projects	7	- -	- -
<u>Soil and Moisture Conservation and</u>			
<u>Land Use Operations, Demonstrations</u>			
<u>and Information:</u> Legal work in con-			
nection with the administration of			
the soil erosion program	- -	36,150	30,000
Total, Supplemental			
Funds	1,221,763	1,509,174	793,465(a)
<u>Civilian Conservation Corps (Act of</u>			
<u>June 28, 1937, and supplemented acts;</u>			
<u>allotment through War Department):</u>			
Legal work in connection with claims			
resulting from Civilian Conservation			
Corps activities	11,518	18,400	- -

(a) The Budget Estimates for 1941 for Flood Control and Emergency Relief are not yet available.

OFFICE OF INFORMATION

(a) SALARIES AND EXPENSES

Appropriation Act, 1940	\$383,040
Transfer, pursuant to provisions of Reorganization Act of 1939 and Reorganization Plans Nos. I and II: To "Salaries, Office of the Secretary of the Interior" for information work in connection with Bureau of Biological Survey	-4,000
From "Salaries and Administrative Expenses, Commodity Credit Corporation"	+6,000
Total available, 1940	385,040
Budget Estimate, 1941	353,080
Decrease	<u>31,960</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase or decrease
1. General administration of Office of Information and of informational work of the Department.....	\$19,970	\$21,300	\$20,580	-\$720 (1)
2. Business service, including mails and files.....	28,510	26,288	22,258	-4,030 (2)
3. Publications preparation and control:				
(a) Editorial control and final preparation of manuscripts.....	33,245	32,580	28,880	-3,700 (3)
(b) Preparation of Year- book and special re- ports.....	12,120	11,980	11,980	- - -
(c) Indexing Department publications.....	9,141	9,082	9,082	- - -
(d) Preparation of illus- trations for publi- cations.....	19,754	19,460	17,040	-2,420 (4)
(e) Photographic service for the Department....	31,428	34,140	34,140	- - -
(f) Printing procurement..	16,438	16,190	11,640	-4,550 (5)
Total, Publications pre- paration and control....	122,126	123,432	112,762	-10,670

PROJECT STATEMENT - Continued.

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase or decrease
4. Distribution of agricultural information directly to the public:				
(a) Control of mailing lists for distribution work.....	\$11,792	\$11,700	\$10,080	-1,620 (6)
(b) Handling Congressional and general-public requests for agricultural information.....	55,186	56,480	53,420	-3,060 (7)
Total, Distribution of agricultural information directly to the public...	66,978	68,180	63,500	-4,680
5. Preparation and distribution of agricultural information to the press.....	31,257	31,460	28,260	-3,200 (8)
6. Preparation and distribution of agricultural information by radio.....	31,565	30,920	26,480	-4,440 (9)
7. Addressing, duplicating, and mailing service for the Department.....	80,585	83,460	76,160	-7,300 (10)
8. Additional for administrative promotions.....	---	---	3,080	+3,080 (11)
Unobligated balance.....	+ 709			
	(a)(b)	(b)	(c)	
Total appropriation.....	381,700	385,040	353,080	-31,960

(a) Excludes \$100 transferred to Bureau of Standards, Department of Commerce, for research on photographic process.

(b) Includes \$6,000 transferred from Commodity Credit Corporation, 1940 and excludes \$4,000 transferred (1940) to "Salaries, Office of the Secretary of the Interior," pursuant to Reorganization Plans Nos. I and II.

(c) Excludes \$6,000 received for 1940 by transfer from the Commodity Credit Corporation pursuant to Reorganization Plan No. I. This will be covered for 1941 by allotment of \$6,000 from the funds of the Commodity Credit Corporation.

INCREASES AND DECREASES

The net reduction of \$31,960 in this item for 1941 consists of:

- (1) A decrease of \$720 in the office of the Director of Information.
- (2) A decrease of \$4,030 in the Business Office, including the mail and files unit. This decrease will be accomplished by dropping two employees from the staff and by financing part of the salary of a third employee from the allotment of \$6,000 from the funds of the Commodity Credit Corporation.
- (3) A decrease of \$3,700 in the editorial office, which edits and prepares manuscripts for publication. This decrease will be accomplished by dropping one employee from the staff.
- (4) A decrease of \$2,420 in the Illustrations Section. This decrease will be made by dropping one employee from the rolls whose salary is \$1,620 and by making a reduction of \$800 in the expenses of the unit.
- (5) A decrease of \$4,550 in the printing procurement section. This decrease in the section which handles the procurement of printing for the Department will be accomplished by dropping one employee whose salary is \$3,100, and by financing a part of the salary of a second employee from the allotment of \$6,000 from the funds of the Commodity Credit Corporation.
- (6) A decrease of \$1,620 in the Mailing Lists Section. This decrease will be accomplished by dropping one employee from the rolls.
- (7) A decrease of \$3,060 in the Distribution Section. This decrease will be accomplished by dropping two employees from the rolls in the section which handles requests for publications from the Members of Congress and the general public.
- (8) A decrease of \$3,200 in the Press Service. This decrease will be accomplished by discontinuing one employee whose salary is \$3,200.
- (9) A decrease of \$4,440 in the Radio Service. This decrease will be accomplished by dropping one employee whose salary is \$1,620 and by making a reduction in the expenses of the Radio Service amounting to \$1,200; one employee's salary will be financed from the allotment of \$6,000 from the Commodity Credit Corporation.
- (10) A decrease of \$7,300 in the Addressing, Duplicating, and Mailing plant. This decrease will be accomplished by dropping three operators in the plant whose salaries aggregate \$4,320, and by making a reduction of \$1,500 in expenses; one employee's salary will be financed from the allotment of \$6,000 from the Commodity Credit Corporation.
- (11) \$3,080 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General. -- The Office of Information is responsible for making available to the public information on the results and progress of the Department's action, research, service, and regulatory programs. Farmers require information on how to utilize Department programs for conservation and proper land use. Scientists of the Department develop information of direct importance to farmers and others. Before this information can be useful to the public it must be brought together and interpreted. The information must be available, prepared, and presented in an accurate, understandable form, and scientific information has to be interpreted to be most useful in connection with the participation of farmers in action programs. The Office of Information is responsible for this work. It relies mainly on publications, the press, and radio. The Office is concerned with all the problems involved in the informational activities of the Department, including the editorial, illustrating, printing, and distribution phases. It also supervises the informational activities of the bureaus and offices and cooperates with 294 radio stations daily, which donate to the Department 120,000 hours of time annually. The Office also prepares or supervises the preparation of approximately 1,900 press releases and 3,500 radio manuscripts annually, and edits about 1,600 technical and popular manuscripts. To maintain an effective policy for agricultural information, the Office of Information cooperates with the State experiment stations and extension services and correlates Department information with that of other Federal agencies. At present greatest emphasis is being placed on conservation or land use programs. The development of an Office of Land Use Coordination within the Department is making it possible for the Office of Information, among other things, to give the public correlated information on related conservation activities such as adjustment, marketing, forestry, and erosion and flood control, all of which have an influence on the proper and wise use of both public and private lands.

1. General Administration of Office of Information and of Informational Work of the Department. -- This office supervises the correlation of the informational work of the bureaus within the Department, and information activities of the Department with those of the Land Grant Colleges and State Extension Services. The office establishes and controls information policies and procedures. It sees to it that the knowledge of the Department is placed in the hands of farmers and others in practical form, and, to a considerable extent, conveys the needs of farmers to the scientists of the Department in order that programs may be focused on the most critical agricultural problems. The Office supervises and participates in reporting to the public the progress of the new action programs including the Agricultural Adjustment program, Farm Security Administration, Federal Crop Insurance Corporation, Rural Electrification Administration, Commodity Credit Corporation, and marketing agencies. The office also determines what types of information are to be disseminated to be of greatest assistance to farmers and others and supervises the integration of knowledge developed by specialists throughout the Department.

2. Business Service, including Mail and Files.--This office handles the business, financial, purchasing, personnel, and related affairs of the Office of Information. It includes the central files section which handles a large volume of letters, vises outgoing mail, and maintains subject matter files and a library for the Office of Information.

3. Publications Preparation and Control.-- From the vast quantity of material prepared by the Department each year the Office of Information must choose what is to be published, determine the form of publication, and the quantity. Under available funds it is impossible to publish all significant material developed in the Department. If this could be done there would be issued approximately 3,000 new circulars and bulletins of various types each year. Because of the limitation of funds for the publication of Department material, the Office of Information selects and arranges for the publication of a total of approximately 1,600 manuscripts including very technical material covering basic economic and scientific research as well as popular manuscripts carrying practical advice to farmers and others. The Office handles the editing, indexing, illustrating, and printing work involved. The Office also prepares the Yearbook of Agriculture and the Secretary's annual report to the President and Congress.

4. Distribution of Agricultural Information directly to the Public.-- Each day 3,000 to 4,000 requests for information come to the Office of Information. These requests are handled by the distribution section.

The number of publications distributed by the section during the past five years has been as follows: 1935,- 15,329,000; 1936,- 17,349,000; 1937,- 17,535,000; 1938,- 20,553,000; 1939,- 22,213,000.

In the fiscal year 1939, each person in the unit handled requests involving the distribution of 1,110,000 copies of bulletins.

The use of Department publications has been found the cheapest and most effective way to get agricultural science into practice and to place economic information in the hands of interested persons. The work of the Distribution Section requires great skill and long experience, for the requests for information must be met from a supply of thousands of bulletins on many different subjects. The Section must make an intelligent selection to meet each request.

In addition, the Office of Information distributes publications regularly to a very small group of cooperating scientists, libraries, and county agents who receive selected bulletins direct through the use of highly classified mailing lists. Specific requests cleared through Members of Congress are handled. The bulletin method of furnishing information to farmers is most economical. The cost of the Government for printing these popular bulletins is about $1\frac{1}{2}$ cents each. If a special letter had to be prepared in response to these requests the cost would average about 30 cents.

5. Preparation and Distribution of Agricultural Information to the Press.--Information arising from the activities of the Department is distributed by the Office of Information directly to the press, including newspapers, farm papers, trade journals, technical publications, press associations, special writers, and correspondents.

Since the Soil Conservation Service, Farm Security Administration, Rural Electrification Administration and other new agencies have become a part of the Department of Agriculture and since new legislation providing for flood control, water utilization, cotton classing, food and drug administration and other mandates of Congress have added to the Department's responsibilities, the burden on the Office of Information has increased considerably. The Office of Information cooperates with newspapers and other periodicals for the purpose of making useful information available to farmers, homemakers, and others. Supplying matter for the use of the newspapers and magazines is one important and inexpensive method of making available to large numbers of interested persons information on the findings of the Department. Information is speedily released to the Press to give readers the latest practical information on the results of the scientific, economic, and regulatory work of the Department. Special articles on farm, garden, and home and scientific matters are prepared for syndicates, magazines, and newspapers. Through these channels practically the entire press of the country receives timely information on the Department's scientific, regulatory, and economic activities. This does not include material for the Agricultural Adjustment Administration. The output of press releases amounts to about 1,900 each year in addition to special articles requiring considerable special work in gathering and preparing information.

6. Preparation and Distribution of Agricultural Information by Radio.--The Office of Information in cooperation with radio networks and stations broadcasts to farmers, homemakers, and others, information on the various activities of the Department. Radio makes it possible to disseminate quickly information having great but ephemeral value. Much of the information developed by the Department must be distributed rapidly in order to insure its full usefulness to farmers and others. The Office of Information uses radio facilities made available by the broadcasters daily to transmit particularly economic and related information and announcements. It prepares and produces daily, except Saturday and Sunday, 15- to 30-minute information programs, broadcast as one feature of the National Farm and Home Hour, presented by the National Broadcasting Company and transmitted by 93 associated stations in the Eastern, Central, Mountain, and Pacific time zones. In addition, 15 minutes daily of information for farmers and homemakers is prepared and produced by a field office in San Francisco and presented by the National Broadcasting Company and a network of 11 stations.

Further, the Office of Information cooperates in presenting once each week a 15-minute broadcast on a National Broadcasting Company network of 47 stations, giving useful information to consumers. The Department part of this program is prepared in collaboration with the Consumers' Counsel of the Agricultural Adjustment Administration. The Office prepares

and sends to 294 independent stations daily, except Sunday, a 7-minute program giving useful information for farmers. The Office likewise sends to 256 stations a daily 7-minute program of information to consumers and homemakers. A total of about 120,000 station-hours of broadcasting time is utilized by the Office each year for presenting timely information by radio. This time is provided by the broadcasters and is not paid for by the Department.

7. Addressing, Duplicating and Mailing Service for the Department.-- For purposes of economy and efficiency, the Office of Information maintains a plant to handle addressing, duplicating and mailing work for the bureaus and offices of the Department, taking care not to duplicate material in violation of the printing laws. Duplication is essential for rapid distribution of administrative material, radio and press releases, market reports, progress reports, and other information too ephemeral in nature to justify printing.

(b) PRINTING AND BINDING

Appropriation Act, 1940.....	\$1,609,570
Transferred pursuant to provisions of the Reorganization Act of 1939 and Reorganization Plans Nos. I and II:	
"Printing and binding, Public Roads Administration".....	- 4,700
"Printing and binding, Department of the Interior" (for Bureau of Bio- logical Survey).....	- 18,000
Available, 1940.....	1,586,870
Budget Estimate, 1941.....	<u>1,586,870</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)
1. Job work and binding, expenditures for printing:			
(a) Binding.....	\$40,791	\$40,000	\$40,000
(b) Emergency field printing:	4,611	10,800	10,800
(c) Job work.....	295,667	618,610	618,610
(d) Letterheads.....	10,460	20,000	20,000
Total.....	351,529	689,410	689,410

PROJECT STATEMENT - Continued.

Projects	1939	1940 (Estimated)	1941 (Estimated)
2. Reports, periodicals, and other regulatory, service, and administrative publications, expenditures for printing:			
(a) Agricultural Situation.....	\$11,616	\$17,000	\$17,000
(b) Annual Reports.....	12,906	18,000	18,000
(c) Briefly Speaking (AAA).....	---	2,500	2,500
(d) Climatological Data.....	4,397	9,900	9,900
(e) Congressional Documents....	5,094	6,000	6,000
(f) Crops and Markets.....	14,917	17,000	17,000
(g) Experiment Station Record..	18,389	19,000	19,000
(h) Extension Service Review...	5,957	7,000	7,000
(i) Farmers' Bulletin Lists....	6,625	8,820	8,820
(j) Fire Control Notes.....	1,041	2,000	2,000
(k) Forest Folders.....	13,665	13,000	13,000
(l) Indexes.....	2,310	2,500	2,500
(m) Instructions and Procedures (AAA).....	---	47,000	47,000
(n) Inventories of Seeds and Plants Imported.....	1,892	2,000	2,000
(o) Journal of Agricultural Research.....	5,999	5,850	5,850
(p) Land Policy Review.....	---	2,200	2,200
(q) Monthly List of Publications	1,316	1,500	1,500
(r) Monthly Weather Review.....	10,991	10,500	10,500
(s) Monthly Weather Review (Separates and Supplements)	1,631	1,600	1,600
(t) Service and Regulatory Announcements.....	23,785	32,000	32,000
(u) Soil Conservation Magazine.	8,376	8,500	8,500
(v) Unnumbered Publications and Reports.....	45,554	48,000	48,000
(w) Yearbook.....	25,000	25,000	25,000
(x) Yearbook Statistical Report	14,000	14,000	14,000
Total.....	235,461	320,870	320,870

PROJECT STATEMENT - Continued

Projects	1939	1940 (Estimated)	1941 (Estimated)
3. Research and Technical Publications, expenditures for printing:			
(a) Circulars.....	\$20,400	\$23,000	\$23,000
(b) Experiment Station Bulletins and Reports.....	2,855	2,300	2,300
(c) Journal of Agricultural Research Separates.....	16,905	17,000	17,000
(d) Reprints and revisions (general).....	4,520	5,000	5,000
(e) Reprints of Outside Articles.....	2,392	2,400	2,400
(f) Soil Surveys.....	75,443	82,000	82,000
(g) Statistical Bulletins.....	18,093	17,700	17,700
(h) Technical Bulletins.....	53,285	52,250	52,250
Total.....	193,893	201,650	201,650
4. Farmers' Bulletins and other popular publications, expenditures for printing:			
(a) Agricultural Adjustment Administration bulletins	---	54,200	54,200
(b) Clip Sheet.....	2,700	3,100	3,100
(c) Farm Security Administration bulletins.....	---	3,640	3,640
(d) Federal Crop Insurance Corporation bulletins...	---	15,500	15,500
(e) Farmers' Bulletins (new)...	25,125	34,300	34,300
(f) Farmers' Bulletins (reprints).....	162,438	166,300	166,300
(g) Leaflets (new).....	6,089	6,600	6,600
(h) Leaflets (reprints).....	9,554	10,200	10,200
(i) Miscellaneous Publications	73,191	72,800	72,800
(j) Posters.....	3,538	5,300	5,300
(k) Yearbook Separates.....	3,752	3,000	3,000
Total.....	286,387	374,940	374,940
Unobligated balance.....	5,000	---	---

PROJECT STATEMENT - Continued

Projects	1939	1940 (Estimated)	1941 (Estimated)
5. <u>Additional</u> available, under transfer authority in Agricultural Appropriation Act for printing in connection with--			
"Parity Payments".....	---	+150,000	+150,000
"Conservation and Use of Agricultural Land Resources" (Marketing quotas, A.A.A.)..	---	+275,000	+275,000
"Exportation and Domestic Consumption of Agricultural Commodities" (Surplus removal)	---	+175,000	+175,000
Total, foregoing items..	---	+600,000	+600,000
Deduct: Transfers as shown under item 5, above.....	---	-600,000	-600,000
Grand total.....	1,072,270(a)	1,586,870 (a)(b)	1,586,870

(a) Excludes \$4,700 and \$18,000 transferred, pursuant to the Reorganization Act of 1939 and Reorganization Plans Nos. I and II: "Printing and binding, Public Roads Administration" and "Printing and binding, Department of the Interior."

(b) Includes increase of \$500,000 for printing and binding for the Agricultural Adjustment Administration, Federal Crop Insurance Corporation, Sugar Division, and activities under the Bankhead-Jones Farm Tenant Act, the funds of which were reduced on this account in the 1940 Appropriation Act.

WORK UNDER THIS APPROPRIATION

General.--The work under this appropriation now includes printing and binding for most of the work of the Department. The fund provides for publishing results of scientific and economic work, printing publications and instructions required by law or otherwise essential in the regulatory, service, and conservation programs and for printed forms, certificates and other material classified as job work. For the fiscal year 1940 Congress consolidated into this appropriation the sum of \$500,000 to provide for printing and binding of certain action programs, including printing required in connection with the agricultural conservation, sugar, and crop insurance programs and programs under the Bankhead-Jones Farm Tenant Act. In so doing, Congress effected an actual reduction of \$91,570 by decreasing the funds available for printing and binding for the action agencies by \$591,570. Congress also authorized the Secre-

tary to transfer to this appropriation not to exceed \$600,000 to be used exclusively for printing and binding necessary in connection with parity payments, marketing quotas, and Section 32 of the Act of August 24, 1935 (marketing and surplus removal activities).

In 1932 the funds available for printing for the branches of the Department then in existence amounted to \$1,000,000. The following year they were decreased to \$660,000. Later the fund was increased to \$887,650. Beginning with the fiscal year 1939, there was consolidated into the fund \$207,320 by transfer from the Soil Conservation Service. For the fiscal year 1940 Congress provided an increase of \$14,600 specifically for Farmers' Bulletins. This gave a total of \$1,109,570, which, coupled with the \$500,000 transfer previously mentioned, brought the 1940 available funds for printing and binding to \$1,609,570.

Subsequently, effective at the beginning of the fiscal year 1940, \$4,700 in printing funds was transferred to the Public Roads Administration. This sum provides for printing and binding which formerly was financed out of this appropriation for the Bureau of Public Roads. Also the sum of \$18,000 was transferred from this appropriation to the printing and binding fund of the Department of the Interior for printing formerly financed out of this appropriation for the Bureau of Biological Survey. Consequently, the total now available for printing on behalf of activities, including the action agencies, is \$1,586,870.

The printing and binding work of the Department is classified under four heads:

1. Job work and binding.
2. Administrative publications.
3. Research and technical publications.
4. Popular publications.

Material in the first two groups is essential to efficient administration within the Department itself. The first category of printing includes job forms and related material. In the second group are all periodicals, reports, highly important instructions and letters to participants in the action programs, and other material needed in the administration of Department programs. In the third group are technical publications vital to scientists, teachers, and others. Group four includes the popular publications used to disseminate practical knowledge in easily understandable language to farmers, transporters, businessmen, housewives, processors, consumers, and the general public and to keep farmers advised on many phases of the action programs.

1. Job Work and Binding

(a) Binding.--Most of the binding work of the Department is done for the central library, the Weather Bureau library, and the Office of Experiment Stations library.

(b) Emergency Field Printing.--Forms, tags, certificates, and other small printing jobs are often needed quickly in field offices of the Department, both in the United States and abroad, and so cannot be printed in the District of Columbia. Therefore, the Joint Committee on Printing grants authority to the Department to have the work done in the field to cover emergency needs under this item.

(c and d) Job Work and Letterheads.--A wide variety of forms, schedules, certificates, etc., are indispensable to carry on the regular activities of the Department. This item now includes also job printing for the action agencies which require millions of forms in connection with nationwide participation in the programs. The letterheads for the Department also fall under this item.

2. Reports, Periodicals, and other Regulatory, Service, and Administrative Publications

(a) Agricultural Situation.--This periodical is used to keep key groups currently informed of the economic situation, including statistics relating to production, movement, consumption, prices, and purchasing power of various commodities. It is sent monthly to crop reporters, a small group of cooperating economists, technical workers, extension agents, and officials of the Agricultural Adjustment Administration.

(b) Annual reports.--Many of the reports under this item are required by law. They make a permanent record of the work performed during the preceding fiscal year. These reports are considerably below their former size. This item now includes the action-agency annual reports.

(c) Briefly Speaking (A.A.A.)--This publication is used to disseminate essential information to A.A.A. committeemen and others cooperating in the Agricultural Adjustment Administration programs. It is printed when material of sufficient importance has accumulated to warrant publication.

(d) Climatological Data.--In addition to the regular issuance of Climatological Data, Bulletin W (Summaries of Climatological Data) is being published. It comprises 106 separates covering the United States, Alaska, and Hawaii.

(e) Congressional documents.--Under this item the Department pays for copies of bills, resolutions, reports, Congressional directories, Congressional Records, etc., as Congressional documents.

(f) Crops and Markets.--This periodical contains statistics and information on crop and livestock estimates (the printing of many of which is mandatory), market information, reports on supplies, stocks, commercial movements, etc.

(g) Experiment Station Record.--This periodical is the cheapest and most effective means of keeping before all research workers abstracts of the world's scientific and economic literature on agriculture. In

this way the Experiment Station Record assists research workers in keeping informed on current scientific developments, with particular reference to the research reports from the State experiment stations, and it effectively promotes the coordination of research itself.

(h) Extension Service Review.--Current information on extension practices is published in this periodical for distribution monthly throughout the extension organization. The periodical also serves to keep extension agents informed on actions of the Agricultural Adjustment Administration. It reviews new extension developments in the various State institutions. It is especially important at this time because extension officials cooperate in the Soil Conservation and Domestic Allotment and other land-use programs.

(i) Farmers' Bulletin lists.--These lists are furnished to Members of Congress, extension agents, and farmers to show available publications. Farmers' Bulletins are mailed only upon request.

(j) Fire Control Notes.--Fire Control Notes is issued bi-monthly to keep members of the staff and cooperators of the Forest Service informed on developments in the techniques of forest-fire control.

(k) Forest folders.--Folders are used to induce the millions of visitors to use the national forests properly in order to reduce the fire hazard. They are also being used by members of the Civilian Conservation Corps as a source of information on forestry purposes and practices.

(l) Indexes.--Indexes become increasingly important as Department publications increase in number and scope.

(m) Instructions and procedures.--This item consists chiefly of letters of an administrative nature, instructions, and procedures for Agricultural Adjustment Administration committeemen to follow in administering the Department's conservation and adjustment programs.

(n) Inventory of seeds and plants imported.--Importations of seeds and plants are becoming more important because of the Department's search for erosion and drought-resistant vegetation. These inventories contain a record of new and little-known seeds and plants procured mostly from abroad for the use of the Department, State experiment stations, and experimenters in appropriate locations throughout the United States.

(o) Journal of Agricultural Research.--The Journal of Agricultural Research carries the most technical reports of pure research performed in the Department and the State experiment stations. Its distribution is limited rigidly to selected libraries.

(p) Land Policy Review.--This periodical presents significant results of research and study in fundamental agricultural problems, supplies information helpful for the organization of county land-use

planning work, seeks to stimulate thought by agricultural leaders and teachers in formulation of sound land policies for communities, counties, States, and the Nation. It is distributed to economists, college instructors, college libraries, Extension and Land Grant College workers, State Planning Boards and Officials within the Department and other departments working on land problems.

(q) Monthly List of Publications.--For economy the Department does not list those who ask to receive all printed publications. The list of new publications is mailed instead. Scientists, economists, foreign and domestic libraries, and teachers make up the bulk of the mailing list.

(r and s) Monthly Weather Review and separates.--Reports of research by the staff of the Weather Bureau are published with records of weather observations in the United States, including climatological charts. This periodical also deals with floods, storms, earthquakes, solar radiation, etc. It is distributed to Weather Bureau field stations, Signal Corps, meteorological and naval air stations, and libraries. For purposes of economy, the separates (each covering a single subject or group of statistics) are distributed separately. This, the only meteorological publication of its kind in the country, is the textbook for weather officials. It is exchanged with foreign weather services. The general public can obtain copies only by purchase.

(t) Service and Regulatory Announcements.--These consist of Bureau of Animal Industry orders, notices of judgment under the Food and Drugs Act, notices of quarantine, and other announcements of a mandatory character, which are essential in carrying forward the Department's regulatory programs.

(u) Soil Conservation Magazine.--This periodical, issued monthly and sent to a selected list of staff members of the Department and associated agencies, (1) conveys administrative information to members of the field staff of the Soil Conservation Service; (2) equips specialists of the Service and cooperating agencies with current technical and scientific knowledge in soil conservation and related fields; (3) serves as a clearing house of ideas and experiences; (4) provides a valuable archive of conservation history; and (5) serves as a reference work of authentic and practical information concerning a comprehensive action program which involves the application of many new technical developments and improvements.

(v) Unnumbered publications.--This series is used for various bulletins which cannot logically be classified in the other Department series. Examples include such publications as "Science Serving Agriculture," "Topsoil, Its Preservation," and "Soil and Water in the Northern Great Plains."

(w) Yearbook of Agriculture.--The Yearbook, which is an annual publication required by law, presents information on the new developments of agriculture. The 1936 and 1937 Yearbooks consisted of a com-

prehensive treatment of the subject of plant and animal breeding. The 1938 Yearbook deals comprehensively with the subject of soils and soil conservation; and the 1939 Yearbook covers the nutrition of humans and animals. The bulk of the Department's distribution is to its own collaborators, and the Congressional distribution (paid for from Congressional funds) is to farmers.

(x) Statistical Report.--The statistics previously incorporated in the Yearbook of Agriculture are now published in a separate volume for purposes of economy. Probably not more than 10 percent of those who receive the Yearbook are interested in the detailed statistics. On the other hand, many persons have a distinct need for additional statistics which were not previously published in the Yearbook.

3. Research and Technical Bulletins

(a) Circulars.--Circulars report in semitechnical form current results of the manifold research programs of the Department. Some examples are "Sweet Potato Propagation and Transplanting Studies" and "Market Classes and Grades of Feeder and Stocker Cattle".

(b) Experiment Station bulletins and reports.--This series is used to report the results of work done at the insular research stations and includes also the annual reports of the insular stations.

(c) Journal of Agricultural Research separates.--As the bound copies of the Journal itself are sent to a very restricted mailing list, separates are printed for scientists who request technical information on the specific subject covered. Only libraries and foreign institutions on an exchange list receive the Journal itself free of charge.

(d) Reprints of former series and of outside articles.--A number of series, such as Department Bulletins, Department Circulars, and Miscellaneous Circulars, have been superseded by other series. However, much scientific information contained in the older publications is necessary in carrying on current work and can be reprinted for less than it would cost to print new manuscripts. The Department also sometimes buys 100 to 200 copies of reprints of current technical material prepared by Department scientists but printed in nongovernmental publications.

(e) Soil surveys.--The soil survey publications are mandatory by law. Soil surveys serve many purposes in research and extension programs. They are a permanent record of soil factors, knowledge of which is essential as a guide to farmers and Federal, State, and private agencies interested in the adaptabilities and values of various lands. For reasons of economy the soil surveys are published on the smallest scale consistent with convenience in filing, ease of handling, and showing needed information over as large an area as possible on a single sheet. Usually this can be done at a scale of 1 inch to the mile, which keeps the cost as low as possible and shows a large area on a single sheet. This is necessary for such purposes as rural zoning, county planning, and other activities which involve a large number of

farms or large area of land. On such a map it is convenient to compare various portions of a large area on one complete base map. Where soils, topography, and other factors are rather uniform over extensive areas a smaller scale may be used. The survey maps and textual information accompanying them are becoming increasingly useful in connection with the coordination of broad land use programs of the Department and cooperating agencies and are extensively used for program planning by the Extension Service, State Planning Boards, State colleges and experiment stations, Federal and private credit agencies, and by fertilizer companies and many other agencies whose work is affected by the general distribution of various land types.

(f) Statistical bulletins.--All statistical publications, including those on futures trading -- the printing of many of which is mandatory -- are contained in this series. An example is "Grade, Staple Length, and Tenderability of Cotton in the United States."

(g) Technical Bulletins.--This is one of the most important series of publications issued by the Department. Technical Bulletins form a permanent record of research results for Department scientists, cooperating institutions, and scientists of the experiment stations. The Department publishes valuable research results in this series to enable the public to obtain the information in a usable form. The length of each manuscript and the number of copies printed has been reduced, but if a research report is to be valuable, it must be complete. Some recent examples of these publications are the "Communicability of Infectious Abortion between Swine and Cattle" and "Stumpage Prices of Privately Owned Timber in the United States."

4. Farmers' Bulletins and Other Popular Publications

(a) Agricultural Adjustment Administration bulletins.--These bulletins are used to disseminate essential information to individual farmers who are eligible to participate in the farm programs. An example of this type of publication is "The 1939 AAA Farm Program." Bulletins designed to inform the general public on the work of the program and its relationship to other phases of our national life are also being issued. Examples of these include materials on specific parts of the program such as "The Wheat Problem," "Give the Range A Chance," and materials on the relationship of agriculture and industry.

(b) Clip Sheet.--The Clip Sheet, sent weekly to 3,500 newspapers, contains brief material on improved farm practices, economic adjustments, conservation farming practices, and accounts of Department activities.

(c) Farm Security Administration bulletins.--Small question-and-answer leaflets explaining the terms of loans and the qualifications of borrowers under the Bankhead-Jones Farm Tenant Act, are distributed to applicants for tenant purchase loans, and question-and-answer leaflets explaining the variable payment plan for repaying tenant purchase loans under the Act are distributed to borrowers.

(d) Crop Insurance bulletins.--Participation of wheat growers in the wheat crop insurance program is made possible only through a thorough understanding of the program on the part of growers. An important element in the educational program to promote such understanding is the series of bulletins issued by the Federal Crop Insurance Corporation, and distributed through State and county farmer-committees. This series consists of several 12- or 16-page publications which outline the general operation of the program and how farmers may avail themselves of its benefits, and leaflets which deal with some particular phase of the program or its application to special wheat production problems in certain areas.

(e, f, g, and h) Farmers' Bulletins and Leaflets - new and re-prints.--Farmers' Bulletins are published to place useful information in the hands of farmers. They constitute one of the most effective means of putting science into practice. Four-fifths of all Farmers' Bulletins are distributed by Members of Congress. The Department and most Members of Congress mail Farmers' Bulletins only upon specific request. The Leaflets are merely 4- and 8-page Farmers' Bulletins. Farmers' Bulletins cost only about 1-1/2 cents a copy. If they did no more than enable the Department to answer correspondence expeditiously and efficiently, they would be worth far more than they cost, as the cost of preparing and mailing a special letter in response to requests for information averages about 30 cents.

(i) Miscellaneous Publications.--Material for specialized distribution is contained in the Miscellaneous Publications. Among them are some conservation publications carrying practical information to the public and such publications as "Planning for a Permanent Agriculture" "The Land in Flood Control," "Motor Fuels from Farm Products", etc. The material is largely nontechnical and the distribution is always specialized.

(j) Posters.--Posters are used sparingly by the Department and then only in connection with special campaigns such as those involving the elimination of livestock diseases, forest fire protection, and various conservation programs.

(k) Yearbook and Statistical separates.--The Yearbook and the Statistical report contain a number of separate, specialized articles and tables comprising related parts in the complete treatment of a broad subject such as genetics or soils, or income and production. Separates are printed in very small volume for use in answering correspondence.

SUPPLEMENTAL FUNDS

Projects	Obligated, 1939	Estimated obligations, 1940	Estimated obligations, 1941
<u>Conservation and Use of Agricultural Land Resources, Department of Agriculture:</u> For informational work in connection with agricultural conservation programs.	\$10,680	\$17,100	\$17,100
<u>Exportation and Domestic Consumption of Agricultural Commodities:</u> For informational work in connection with the exportation and domestic consumption of agricultural commodities	---	14,920	13,500
<u>Land Utilization and Retirement of Submarginal Land, Department of Agriculture:</u> For informational work in connection with the land utilization and retirement of submarginal land program..	7,200	9,000	2,800
<u>Administration of the Sugar Act of 1937, Department of Agriculture:</u> For informational work in connection with the administration of the Sugar Act.....	---	7,500	7,500
<u>Emergency Relief, Agriculture:</u> For informational work in connection with rehabilitation program of the Farm Security Administration.....	5,315	40,510	(a)
For standard and departmental forms for use in connection with emergency relief programs of the Department.....	15,000	---	---
<u>Flood Control, General (Transfer to Agriculture):</u> For informational work in connection with the flood control program of the Department of Agriculture...	4,701	3,000	(a)
<u>Rural Electrification, Department of Agriculture:</u> For informational services arising out of the programs of the Rural Electrification Administration.....	---	5,000	5,000

SUPPLEMENTAL FUNDS - Continued.

Projects	: Obligated, 1939	: Estimated obligations, 1940	: Estimated obligations, 1941
<u>Administration of Federal Crop Insurance Act, Department of Agriculture:</u>	:	:	:
For informational work in connection with the administration of the Federal Crop Insurance Act	---	\$5,000	\$4,800
<u>Commodity Credit Corporation, Department of Agriculture: For informational work in connection with the program of the Commodity Credit Corporation.....</u>	---	(b)	6,000
Total	\$42,896	102,030	56,700

(a) The Budget estimates for 1941 for Flood Control and Emergency Relief are not yet available.

(b) Financed in 1940 by transfer to "Salaries and Expenses" of \$6,000 under Reorganization Plan No. I.

LIBRARY

SALARIES AND EXPENSES

Appropriation Act, 1940.....	\$109,220
Transfers pursuant to the provisions of the Reorganization Act of 1939 and Reorganization Plans Nos. I and II:	
"Library, Department of the Interior".....	- 750
"Salaries and Expenses, Library, Public Roads Administration".....	- 500
Available, 1940.....	107,970
Budget Estimate, 1941.....	105,000
Decrease.....	<u>2,970</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Decrease
1. General administration and business service.....	\$18,713	\$18,510	\$18,510
2. Acquisition of publications by purchase, gift, and exchange, and preparation of material for binding.....	49,197	47,550	44,580	- \$2,970(1)
3. Classifying, cataloging, and indexing of publications.....	20,630	22,295	22,295
4. Circulation, reference, and bibliographical service.....	16,380	19,615	19,615
Unobligated balance.....	500	---	---	---
Total appropriation.....	105,420	107,970	105,000	- 2,970

(1) The decrease of \$2,970 in the Library appropriation will be effected by a reduction in the allotment for the acquisition of books and periodicals.

WORK UNDER THIS APPROPRIATION

General.--- The Library is one of the basic units in the research, extension, and regulatory work of the Department and the State agricultural agencies. It acquires, records, and makes readily available for reference and circulation, through its catalogs, indexes, and bibliographical lists, the important books, periodicals, and other publications containing information upon the subjects under investigation by the Department. With its branches in the various bureaus it contains approximately 300,000 volumes, probably the most extensive agricultural collection existing in any country. Its catalogs and special indexes, comprising more than 2,000,000 cards, furnish an invaluable key to the literature of agriculture and enable the Library to give outstanding service along bibliographical lines in the field of

agriculture and the related sciences. Its services are used not only by the Department but also by other Government offices in Washington and by investigators throughout the country. Its aim in general is to serve as the national agricultural library. The appropriation of the Library is used for four main purposes, as follows:

1. General administration and business service.-- The administrative and business office handles the finances, correspondence, and personnel matters. It also is charged with the ordering of books, periodicals, and newspapers, the purchase of equipment and supplies, and the upkeep of the Library quarters.

2. Acquisition of publications by purchase, gift, and exchange, and preparation of material for binding.-- The Library acquires through purchase the scientific, technical, and economic books and periodicals needed in the work of the Department, including the common and very frequently used reference books such as dictionaries, handbooks, directories, and atlases, for filing in the various offices. In addition, it collects by gift and exchange the publications of societies and institutions, both American and foreign, bearing upon agriculture and the related sciences of interest in the activities of the Department.

3. Classifying, cataloging and indexing of publications.-- The Library maintains author and subject catalogs of the book resources of the Department and also special indexes on various subjects, comprising in all two million cards. Through these catalogs, special indexes, and current lists of accessions, the collections are made readily available.

4. Circulation, reference, and bibliographical work.--The Library circulates books and periodicals which are needed by Department workers in their work, especially in research, and assists them in gathering references on scientific and economic subjects and problems which are being investigated. It supplies reference material and bibliographical information needed in answering the various inquiries addressed to the Department and assists the State agricultural colleges and experiment stations and other scientific institutions through the loan of its books. In general, it endeavors to perform the functions of a national agricultural library and of a clearing house for bibliographical information relating to the literature of agriculture in all its phases.

OFFICE OF EXPERIMENT STATIONS

(a) PAYMENTS TO STATES, HAWAII, ALASKA,
AND PUERTO RICO FOR AGRICULTURAL EXPERIMENT STATIONS

Appropriation Act, 1940.....\$6,848,750
 Budget Estimate, 1941..... 6,865,000
 Increase..... 16,250

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. Hatch Act (Act March 2, 1887)	\$720,000	\$720,000	\$720,000	- - -
2. Adams Act (Act March 16, 1906)	720,000	720,000	720,000	- - -
3. Funnell Act (Act February 24, 1925)	2,880,000	2,880,000	2,880,000	- - -
4. Hawaii Station Act (Act May 16, 1928)	55,000	60,000	70,000	+ \$10,000(1)
5. Alaska Station Act (Act February 23, 1929)	15,000	15,000	15,000	- - -
6. Alaska Station Act (Act June 20, 1956)	8,750	8,750	10,000	+ 1,250(2)
7. Puerto Rico Station Act (Act March 4, 1931)	42,500	45,000	50,000	+ 5,000(3)
8. Bankhead-Jones Act, Title I (Act June 29, 1935)	2,100,000	2,400,000	2,400,000	- - -
Total appropriation ...	6,541,250	6,848,750	6,865,000	+ 16,250

INCREASES

The increase of \$16,250 in this item for 1941 consists of:

(1) An increase of \$10,000, in accordance with the provisions of ^{the} Hawaii Station Act of May 16, 1928, to provide for investigations by the Hawaii Agricultural Experiment Station looking to the establishment and maintenance of a permanent and efficient agricultural industry in the Hawaiian Islands.

This increase of \$10,000 is urgently needed by Hawaii to aid in assuring a food supply for the population. This distant section of the United States is far from being agriculturally self-sufficient. From 60 to 65 percent of the food supplies for Hawaii are imported, including such essentials as meats, dairy products, flour, and vegetables. This situation has come about because Hawaii was naturally adapted to the production of pineapples and sugar which could be shipped to the mainland from which food supplies could be obtained. There has

been a growing realization in Hawaii, however, that an agricultural economy which is so largely restricted to two crops may have serious disadvantages. The interest in diversification of Hawaiian agriculture consequently has been increasing in recent years. The difficulty in the establishment of diversified agriculture in Hawaii has been the lack of knowledge of how numerous foodstuffs could be produced economically under Hawaiian conditions. The lack of diversification in Hawaiian agriculture creates a situation of which there is need for general improvement. In addition, the dependence of Hawaii upon imports for its foodstuffs would be of major concern in case of a national emergency in which the islands became isolated. The problems in Hawaii needing agricultural research, therefore, are twofold: (1) The development of additional crops and increased diversification on an economical production basis for the general improvement of the Hawaiian agricultural economy; and (2) through experimentation, the securing of facts and knowledge as to suitable crops, and methods of planting, cultivation, and harvesting which could be applied without delay for the production of at least minimum maintenance rations in case of an emergency in which food imports were reduced or entirely cut off.

Research under way at the Hawaii Agricultural Experiment Station has given promising indications that this situation can be substantially improved. These investigations need strengthening to develop and extend the possibilities and their application. Progress as rapidly as practicable is important. The station's program includes studies of the mineral and vitamin content of Hawaiian food crops and their value for human nutrition, investigations of the value and digestibility of Hawaiian forage and grass crops as livestock feeds, research on the improvement of poultry for egg and meat production, breeding work with truck crops, fruits, and nuts to develop varieties suitable to Hawaiian conditions, investigations to determine the best cultural practices for growing these crops in the islands, studies to control the diseases and insects of the principal truck and fruit crops, and investigations to maintain the fertility of Hawaiian soils. The agricultural research conducted in the continental United States by the State stations and by the Federal Department of Agriculture has little direct practical and economic application to Hawaii because of the wide differences in such factors as soils, climate, and length of day in the islands as compared with mainland conditions.

The funds totaling \$410,000 for investigations for the benefit of Hawaiian agriculture, originally made available in the fiscal year 1936 from Sugar Progressing Tax Funds and continued under the appropriation "Payments for Agricultural Adjustment", are now exhausted. With the exhaustion of these funds and the discontinuance of the former Federal station at the close of the fiscal year 1938, the Territorial station, to whose benefit the proposed increase would accrue, must now assume full responsibility for conducting research to improve Hawaiian agriculture.

The appropriations for the Hawaii station are authorized by the Act of May 16, 1928, which extends to the Territory of Hawaii the benefits of the Hatch, Adams, and Furnell Acts, under which each of the States receives \$90,000 annually for agricultural experiment stations. The Act of 1928 authorizes appropriations beginning with \$15,000 in 1930 and a series of gradually increasing appropriations, under which Hawaii would receive \$60,000 in 1938, \$70,000 in 1939, \$80,000 in 1940, and \$90,000 in 1941 and subsequent years. The appropria-

tions were \$50,000 in 1938, \$55,000 in 1939, and \$60,000 in 1940. The amount of the estimate for 1941 is \$70,000, which is \$20,000 less than the amount authorized.

(2) An increase of \$1,250, in accordance with the provisions of the Alaska Station Act of June 20, 1936, to provide for investigations by the Alaska Agricultural Experiment Station to improve Alaskan agriculture.

This Territory of the United States situated so far distant from the States and with agricultural problems peculiar to its own special conditions, has particular need of Federal assistance for research. The research conducted in the States by the State experiment stations and the Department is not directly applicable to Alaska, where such vital agricultural factors as climate, length of day, and soils are entirely different from those in the States.

The funds now available are inadequate for effective service to those already engaged in some form of agriculture within the Territory, such as farming within the Matanuska and Fairbanks regions, gardening throughout Alaska, and fur farming throughout the Territory. In addition, we feel that it is worthy of consideration that the time may come when we will undertake further settlement and development of this large Territory whose agricultural possibilities are as yet largely unknown. The basic facts which would mean success in such an undertaking can be supplied only by research, which requires time and should, therefore, be carried forward now so that the results will be available for any further development which may be undertaken later.

The most urgent problems in Alaska requiring agricultural research are the need for the development of improved varieties and strains of plants for Alaskan conditions and the need for facts necessary for successful poultry husbandry in this Territory.

Results have been achieved in the testing and selection of varieties and strains of fruits, forage, and grain crops which can only be brought together through scientific plant breeding. Such characters as winter resistance, which is so important in Alaska, and quality are not always found in the same variety or strain but by plant breeding these desirable and valuable characters may be united in one and the same variety or strain. This work would no doubt be of real benefit to the Alaskan farmer in his fruit, forage, pasture, and grain production and would tend to provide more adequate supplies of these crops for farm and other local use.

The farmers in Alaska as elsewhere are confronted with disease and management problems in the raising of poultry. Results of studies of these problems conducted in the continental United States are applicable to the very different conditions in Alaska only to a limited extent. The solution of these problems is dependent upon research. The problem is of especial importance to the farmer, as an adequate supply of poultry products is a great factor in providing food for himself and his family, and some return for the year around exacting work which poultry raising demands in this distant Territory of the United States.

The Alaska Station Act of June 20, 1936, which authorizes the increase of \$1,250 extends the benefits of the Adams and Purnell Acts to the Territory

of Alaska and authorizes appropriations as follows: fiscal year 1937, \$5,000; 1938, \$7,500; 1939, \$10,000; 1940, \$12,500; 1941, \$15,000; and in succeeding years gradually increasing appropriations until 1947 when the authorized appropriation is \$37,500, which is one-half of that provided for each State under the Adams and Purnell Acts. The appropriations for 1939 and 1940 were \$8,750. The amount estimated for 1941, \$10,000, is \$5,000 below the authorization for that year.

From 1898 until 1932 the Department of Agriculture maintained Federal agricultural experiment stations in Alaska. The appropriation for this purpose in 1931 was \$25,500. Since 1932, when the Federal stations were closed, the Alaska Territorial Experiment Station has had full responsibility for investigations to improve the agriculture in this large Territory.

(5) An increase of \$5,000, in accordance with the provisions of the Puerto Rico Station Act of March 4, 1931, to provide for research by the Puerto Rico Agricultural Experiment Station to improve the agriculture of Puerto Rico.

Puerto Rico has a population of 501 people per square mile, which is greater than that of such generally recognized densely populated countries as Japan, Italy, and Germany. This part of the United States is almost entirely dependent upon agriculture for its income, but with its dense population there is less than one-half acre of arable land per person. During the decade between 1920 and 1930, the population increased 18.7 percent. Puerto Rico, therefore, with population-pressure problems, with a shortage of arable land, and with agriculture almost the sole source of income, has acute need of research to aid in the solution of its agricultural problems.

There is real need for extensive investigations in tropical animal industry looking to the development of a better balanced diet for the population. Puerto Rican rations are long on fats and carbohydrates and short on protein, minerals, and some of the vitamins. Studies are needed: On the breeding, feeding, and management of chickens, turkeys, ducks, geese, pigs, and other domesticated animals as sources of protein foods for the population; on milk production including the breeding and feeding of dairy cows and milk goats; on milk goats to develop a type best suited to Puerto Rican conditions as a source of milk for the children of Puerto Rico who do not now have enough of this food for their healthy development; on the diseases and parasites of farm animals which are more destructive in the tropical climate of Puerto Rico than they are in the continental United States.

The production of off-season fruits and vegetables offers possibilities of providing exports for Puerto Rico and for improving the food supply of individual farms. There is need for breeding work to develop commercial strains of fruits and vegetables and for marketing research to improve outlets for Puerto Rican products. There is urgent need for pineapple breeding as the varieties now grown are "running out".

Puerto Rico with its population pressure problems presents an unusual need for a thorough scientific analysis of the question of population.

The large number of people to be supported on such a small area of arable land per person has given rise to a farm credit and farm debt situation which needs detailed and comprehensive analysis. Rural education and rural health problems should be studied more intensively as a basis for improvement of the condition of the largest part of the population and investigations should be conducted to develop rural self-sufficiency, including improvement in the economy of the rural home.

Soil conservation research needs broad amplification and extension to different parts of the Island to safeguard the agriculture of Puerto Rico which is the basis for its livelihood.

Of the problems indicated above for which funds are needed, the most immediate needs are in the field of tropical animal industry to provide a better balanced diet for the population, in the field of horticulture to develop commercial strains of fruits and vegetables to provide exports and a better food supply for farms, and in the field of marketing to develop better outlets for Puerto Rican products.

The Puerto Rico Station Act of March 4, 1931, which extends to Puerto Rico the benefits of the Hatch, Adams, and Furnell Acts, authorizes successively increasing appropriations until the amount reaches \$90,000, the same that each State receives under the Hatch, Adams, and Furnell Acts. The Act of March 4, 1931, authorizes appropriations of \$45,000 for 1939; \$50,000 for 1940; and \$60,000 for 1941.

The appropriations were \$42,500 in 1939 and \$45,000 in 1940. The amount estimated for 1941, \$50,000, is \$10,000 below the amount authorized for that year.

The increase of \$5,000 estimated for 1941 for the Puerto Rico Agricultural Experiment Station would make possible the initiation of work on some of the more urgent problems mentioned above. With so many problems requiring agricultural research in Puerto Rico, it is important that work be started on as many of them as possible to develop the facts to aid in their solution.

WORK UNDER THIS APPROPRIATION

General.--The several appropriations under "Payments to States", etc., represent the Federal Government's encouragement and support to the State, Territorial, and Puerto Rican agricultural experiment stations which were established as departments of the land-grant colleges, pursuant to the provisions of the Hatch Act of 1887. In view of the diversity of agricultural conditions and enterprises throughout the country, the Hatch Act and Adams Act of 1906 which followed it specified, in authorizing appropriations for these stations for agricultural research, that the investigations conducted should be with "due regard to the varying conditions and needs of the respective States and Territories".

The appropriations for agricultural experiment stations under the various Federal grant fund acts described below are used by the stations

for research to meet the agricultural problems of their own States from the standpoint of immediate local needs and from the standpoint of participation in regional and national agricultural programs.

Each State must deal with problems of production and distribution of crops and livestock -- problems of crop variety, fertilizer use, insect and disease control, livestock feeding, storage, loss from decay, etc.

Furthermore, each State represents a part of the national picture as regards the programs of agricultural adjustment, soil conservation and erosion control, resettlement, flood control, and rural electrification. The State experiment station is the one agency to which the majority of farmers go for information and solution of the problems as they affect the individual farm. It would seem logical that the State agency, because of its accumulated facts and experience and local knowledge over a period of 50 years, could not and should not avoid active participation in developing, assembling, and interpreting facts needed in working out sound adjustments for the individual State and its varying conditions under these major national programs. The States participate in such activities as the soil survey and classification which is basic to most, if not all, programs; in cooperating with the Federal agencies to bring together, appraise, and consolidate all available facts for the improvement of agricultural adjustment programs; in carrying on new observations, experiments, and research to find, if possible, substitute agricultural enterprises where existing enterprises should be changed if soils are going to be preserved; in adjusting livestock and farm management practices where additional pastures and hay crops or other modifications are clearly needed for soil conservation and land-use adjustment; and in cooperating through consultations and supplying factual data in connection with the national flood control, water resources, and crop-insurance programs.

The need from a National and State standpoint for participation on the part of each State along these lines is apparent from the fact that for the United States as a whole we must deal with approximately 775 type-of-farming areas. Even considering this many type-of-farming areas, State station representatives must adjust and adapt findings for recommendations to fit many additional combinations of soils, markets, transportation, land ownership, ability, and finances of the individual farmers.

Aside from these problems which we might identify in connection with the over-all programs affecting all States, there are many appeals, including requests for the establishment of field stations, from groups of farmers for additional assistance in the study of crop and livestock problems in localities differing from areas within the State where such studies are now under way. In a number of such cases appeals for assistance have been made to the Department of Agriculture. It has seemed to the Department that the initiative in work on these local problems of the State should be assumed by the State, the Federal Government assisting as it has done since 1887 through grant funds under these experiment station acts.

The people of the States even during the depression and without any matching requirement in order to receive Federal funds made available for

support of the Agricultural Experiment Station work over \$2 from State sources to each \$1 from Federal sources for the support of their stations.

The Federal-grant funds are warranted direct by the Treasury Department, upon certification by the Secretary of Agriculture, to the institutions designated by the several States, Hawaii, Alaska, and Puerto Rico in accordance with the following Acts:

1. The Hatch Act (March 2, 1887) authorizes \$15,000 per annum to each State for agricultural experiment stations to "aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science."

2. The Adams Act (March 16, 1906) authorizes \$15,000 per annum to each State for the more complete endowment and maintenance of the State agricultural experiment stations to be "applied only to paying the necessary expenses of conducting original researches or experiments bearing directly on the agricultural industry of the United States."

3. The Furnell Act (February 24, 1925) authorizes \$60,000 per annum to each State for the more complete endowment of agricultural experiment stations to be "applied only to paying the necessary expenses of conducting investigations or making experiments bearing directly on the production, manufacture, preparation, use, distribution, and marketing of agricultural products and including such scientific researches as have for their purpose the establishment and maintenance of a permanent and efficient agricultural industry and such economic and sociological investigations as have for their purpose the development and improvement of the rural home and rural life and for printing and disseminating the results of said researches."

4. The Hawaii Station Act (May 16, 1928) extends the benefits of the Hatch, Adams, and Furnell Acts to the Territory of Hawaii and authorizes appropriations for this purpose as follows: Fiscal year 1930, \$15,000; 1931, \$20,000; 1932 to 1936, inclusive, \$2,000 increase each year over the preceding year; 1937, \$50,000; 1938 to 1941, inclusive, \$10,000 increase each year over the preceding year; and thereafter \$90,000 per year.

5. The Alaska Station Act (February 23, 1929) extends the benefits of the Hatch Act to the Territory of Alaska and authorizes an appropriation of \$15,000 per annum for this purpose.

6. The Alaska Station Act (June 20, 1936) extends the benefits of the Adams and Furnell Acts to the Territory of Alaska and authorizes appropriations as follows: Fiscal year 1937, \$5,000; 1938, \$7,500; 1939 to 1944, inclusive, \$2,500 increase each year over the preceding year; 1945 to 1947, inclusive, \$5,000 increase each year over the preceding year; and thereafter a sum equal to one-half that provided for each State and Territory under the Adams Act and the Furnell Act.

7. The Puerto Rico Station Act (March 4, 1931) extends the benefits of the Hatch, Adams, and Furnell Acts to Puerto Rico and authorizes

appropriations as follows: Fiscal year 1933, \$15,000; 1934 to 1940, inclusive, \$5,000 increase each year over the preceding year; 1941 to 1944, inclusive, \$10,000 increase each year over the preceding year; and thereafter \$90,000 per year.

8. The Bankhead-Jones Act, Title I (June 29, 1935) authorizes payments to States, Hawaii, Alaska, and Puerto Rico for agricultural research and provides for the Special Research Fund, Department of Agriculture. For these two purposes the following appropriations were authorized: 1936, \$1,000,000; 1937, \$2,000,000; 1938, \$3,000,000; 1939, \$4,000,000; 1940 and thereafter, \$5,000,000. The Act provides that of the sums appropriated for any fiscal year, sixty per centum shall be available for payments to States, Hawaii, Alaska, and Puerto Rico on the basis of rural population and forty percentum shall be available for the Special Research Fund. The amounts authorized were appropriated for the fiscal years 1936, 1937, and 1938. The appropriation for 1939 was \$3,500,000 of which, in accordance with the Act, sixty per centum was for payments to States, Hawaii, Alaska, and Puerto Rico and forty per centum for the Special Research Fund. For the fiscal year 1940, \$2,400,000 for payments to States and \$1,400,000 for the Special Research Fund were appropriated. The Special Research Fund is a separate item in the Agricultural Appropriation Act.

The estimate for payments to States under Title I of the Bankhead-Jones Act is \$2,400,000 for the fiscal year 1941 which is \$600,000 below the amount authorized for that year.

The appropriation for payments to States, Hawaii, Alaska, and Puerto Rico under Title I of the Bankhead-Jones Act is for agricultural research similar to that specified in section 1 of the Act as follows:

"research into laws and principles underlying basic problems of agriculture in its broadest aspects; research relating to the improvement of the quality of, and the development of new and improved methods of production of, distribution of, and new and extended uses and markets for, agricultural commodities and by-products and manufactures thereof; and research relating to the conservation, development, and use of land and water resources for agricultural purposes."

Section 5 of the Act provides: "No allotment and no payment under any allotment shall be made for any fiscal year in excess of the amount which Puerto Rico or the State or Territory makes available for such fiscal year out of its own funds for research and for the establishment and maintenance of necessary facilities for the prosecution of such research."

The allotments under the Act to the several States, Alaska, Hawaii, and Puerto Rico as appropriated for the fiscal years 1939 and 1940 and as estimated for the fiscal year 1941 are shown in the following table:

PAYMENTS TO STATES, HAWAII, ALASKA, AND PUERTO RICO UNDER BANKHEAD-JONES ACT,
TITLE I

Station	Appropriated, 1939	Appropriated, 1940; same amount estimated for 1941.
Alabama.....	\$72,558.23	\$82,695.12
Alaska.....	1,956.92	2,236.48
Arizona.....	10,869.74	12,422.56
Arkansas.....	55,985.30	63,983.20
California.....	57,699.21	65,941.96
Colorado.....	19,627.09	22,430.96
Conn. (New Haven).....	9,037.91	10,329.04
Conn. (Storrs).....	9,037.91	10,329.04
Delaware.....	4,583.93	5,010.20
Florida.....	26,951.43	30,801.64
Georgia.....	76,582.56	87,522.92
Hawaii.....	8,038.10	9,186.40
Idaho.....	12,003.74	13,718.56
Illinois.....	75,894.45	86,736.52
Indiana.....	54,882.28	62,722.60
Iowa.....	56,747.81	64,854.64
Kansas.....	43,794.59	50,050.96
Kentucky.....	69,070.78	78,938.04
Louisiana.....	48,241.76	55,133.44
Maine.....	18,105.64	20,692.16
Maryland.....	24,981.67	28,550.48
Massachusetts.....	15,909.43	18,182.20
Michigan.....	58,596.86	66,967.84
Minnesota.....	49,697.93	56,797.64
Mississippi.....	63,569.98	72,651.40
Missouri.....	67,346.82	76,967.80
Montana.....	13,565.27	15,503.16
Nebraska.....	53,929.52	58,776.60
Nevada.....	2,155.06	2,460.64
New Hampshire.....	7,312.55	8,357.20
New Jersey.....	26,710.11	30,525.84
New Mexico.....	12,040.88	13,761.00
New York (Geneva).....	7,860.26	8,983.16
New York (Ithaca).....	70,742.42	80,848.48
North Carolina.....	89,739.50	102,628.00
North Dakota.....	21,591.29	24,675.76
Ohio.....	31,327.92	35,014.76
Oklahoma.....	59,894.48	68,450.84
Oregon.....	17,653.83	20,175.80
Pennsylvania.....	117,853.33	134,689.52
Puerto Rico.....	42,483.14	48,552.16
Rhode Island.....	1,980.86	2,263.84
South Carolina.....	52,031.84	59,464.96
South Dakota.....	21,378.38	24,432.44
Tennessee.....	65,435.90	74,783.88
Texas.....	130,694.16	149,364.76
Utah.....	9,190.72	10,503.68
Vermont.....	9,162.65	10,471.60
Virginia.....	62,251.49	71,144.56
Washington.....	25,826.26	29,515.72
West Virginia.....	47,086.76	53,813.44
Wisconsin.....	52,696.77	60,224.88
Wyoming.....	5,914.58	6,759.52
Total.....	2,100,000.00	2,400,000.00

(b) ADMINISTRATION OF GRANTS TO STATES
AND COORDINATION OF RESEARCH

Appropriation Act, 1940	\$161,735
Budget Estimate, 1941	162,939
Increase	<u>1,204</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
Administration and coordination of Federal aid to agricultural experiment stations; assistance in coordination of research work of the Department; assistance in coordination of research work of the Department with that of the State stations; administration of Department insular stations; and preparation of "Experiment Station Record" and other publications....	\$161,001	\$161,735	\$161,735	---
Additional for administrative promotions.....	---	---	1,204	(1) +\$1,204
Reserve and unobligated balance.....	734	---	---	---
Total appropriation.....	161,735	161,735	162,939	+ 1,204

INCREASE

(1) The increase of \$1,204 in this item represents the additional amount estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

CHANGES IN LANGUAGE

The estimates contemplate that the language of the first part of the paragraph covering this item be amended in such manner as to delete the seven individual code citations following each of the acts mentioned authorizing Federal-grant funds for the State and Territorial agricultural experiment stations and substituting, at the conclusion of the reference to the acts, one code citation covering all of the acts mentioned. The code citations for the individual acts which are being deleted are repetitions of those shown under the subappropriation, Payments to States, Hawaii, Alaska, and Puerto Rico for Agricultural Experiment Stations. The language of the item will be simplified by the elimination of this repetition.

WORK UNDER THIS APPROPRIATION

The Office of Experiment Stations (a) represents the Department in the administration of the Acts of Congress making appropriations for the support of

State and Territorial agricultural experiment stations in the several States, Hawaii, Alaska, and Puerto Rico (Hatch Act, Adams Act, Purnell Act, and the Hawaii, Alaska, and Puerto Rico Station Acts); (b) assists in the coordination of the research work of the Department and the coordination of the research of the State agricultural experiment stations under Federal grants, together with the coordination of such research with that of the Department; and (c) administers the Federal agricultural experiment station in Puerto Rico.

Administration of the Acts granting funds to States and Territories involves supervision of the funds, close advisory relations with the stations as to research for which the funds are expended, annual examination of the work and expenditures of each station, coordination of the research activities of the Department with those of State stations, preparation and issuance of "Experiment Station Record" and other reports, and preparation of the annual report to Congress on the work and expenditures of the stations as required by law.

The Federal funds paid to the States and Territories are largely expended on research projects submitted to the Office of Experiment Stations for advisory suggestions and approval in advance of expenditures. Programs of projects with proposed expenditures under the Federal funds are submitted by each station for review and approval at the beginning of each fiscal year. Changes and adjustments in work to best meet State needs are submitted throughout the year. There were 2,203 active Adams and Purnell projects in 1939, of which 304 were new or revised during the year.

To carry out the provisions of the Federal Acts a representative, or representatives, of the Office visits each of the 50 State stations at least once annually and spends four to twenty-one days reviewing the expenditures and the research under way. In addition, staff members cooperate as specialists with individual stations and regional groups in the consideration of research programs for special fields.

As is explained under the heading "Special Research Fund, Department of Agriculture," the Office also has the responsibility for the administration of the payments to States authorized by Title I of the Bankhead-Jones Act of June 29, 1935.

Coordinating the research of the Department of Agriculture with that of the State and Territorial stations and coordinating the research work among State stations is constantly in mind when the proposed research projects under Federal funds are reviewed for approval and when the work and expenditures of each station are reviewed and discussed with the State station directors and research staffs. Through personal conferences and committees having to do with research, close advisory relations are maintained with bureaus of the Department. Every opportunity is taken to promote effective cooperation between and among the State stations and between the State stations and the Department. During the fiscal year 1939 there were approximately 1,400 new or revised formal memoranda of understanding and agreements covering over 1,000 cooperative research undertakings between State stations and the bureaus of the Department which were reviewed, approved, and filed by the Office of Experiment Stations. The number of formal agreements and understandings entered into by individual stations ranged from 9 to 59 with an average of 29 for each State.

"Experiment Station Record" was established in 1889 as a part of the Federal-State joint participation in establishing and maintaining agricultural experiment stations. Its purpose is to make available promptly to staff members of all stations and the Department abstracts of current published results of research in this and other countries as an aid in planning research, avoiding duplication, and coordinating research effort. A total of about 6,800 such abstracts are prepared, edited, and published annually, involving translations from a number of the principal foreign languages. The abstract volumes are supplemented by indexes and a combined index is published for each ten volumes. Few, if any of the stations have all the publications available, and the abstracting done by the Office of Experiment Stations avoids the necessity of duplicate abstracting by the several thousand research workers.

As a central agency for the State stations, the Office of Experiment Stations compiles lists of research projects in special fields, maintains an up-to-date list of the organization and personnel of the several stations and publishes a revised list annually, issues a monthly mimeographed list of new station publications, and prepares other lists and compilations of information.

The Office answers a large volume of inquiries from all parts of the world regarding the organization, personnel, relationships, and work of the State stations and agricultural conditions and possibilities in Hawaii, Alaska, Guam, the Virgin Islands, and Puerto Rico.

Assistance in coordinating the research work of the Department of Agriculture is accomplished through advising the bureau chiefs and the Secretary of Agriculture with regard to the coordination and correlation of proposed research. Special attention is given to adjustments of closely related research in different bureaus and to the coordination and integration of any new research with existing activities of the Department. The Chief of Office as Director of Research participates in the preparation of research programs and budget estimates, especially in regard to coordination and cooperation, and serves on some 18 committees having to do primarily with policy, coordination, and cooperation in research.

The Office of Experiment Stations is responsible for the development of the programs, for presentation to the Secretary, of work to be undertaken by the bureaus of the Department under special research projects and at the special research laboratories in the major agricultural regions provided for by Title I of the Bankhead-Jones Act of June 29, 1935; for assistance in the development of cooperation with the State experiment stations, individually and by regions, in connection with the research of these laboratories; for general assistance in planning, directing, and supervising the work under the Special Research Fund; and for the general administration of the funds. To accomplish these broad purposes effectively and economically without the establishment of a separate unit, the work is handled by staff members of the Office who are also engaged in the administration of the Federal-grant funds for the State experiment stations and in the coordination of the research under these funds between stations and with the Department.

The Office now has additional responsibility and additional work in connection with the task of planning and coordinating the program of the four new

utilization of farm products regional research laboratories authorized by Section 202 of the Agricultural Adjustment Act of 1938 and of coordinating the work of the Department and the work of the State stations with the program of these laboratories. Under the provisions of Section 202, the Secretary is authorized and directed to use annually for the research program of these laboratories not to exceed four million dollars, one fourth of which shall be allocated to each laboratory. In connection with this program to develop new scientific, chemical, and technical uses for farm products, "the Secretary is authorized and directed to cooperate with other departments or agencies of the Federal Government, States, State agricultural experiment stations, and other State agencies and institutions, counties, municipalities, business or other organizations, corporations, associations, universities, scientific societies, and individuals, upon such terms and conditions as he may prescribe."

To develop and carry forward this broad program on a Department level, the Secretary has assigned the operating functions of these laboratories to the Bureau of Agricultural Chemistry and Engineering and has provided: (1) that the Director of Research shall be responsible for the planning and coordination of the program whether conducted by the Bureau of Agricultural Chemistry and Engineering or other bureaus of the Department; (2) that expenditure of the funds for these laboratories shall be made on the basis of projects which have been reviewed and approved by the Director of Research and Chief, Office of Experiment Stations. Acting as a central clearing house of information as to the program of each State experiment station and as to records of cooperation between the bureaus of the Department and the State stations, the Office staff naturally and necessarily will be called upon continuously for information and assistance.

Administration of the Federal experiment station in Puerto Rico includes approval of research projects, budgets, and expenditures; the review, editing, and approval of publications; and general administrative direction of the activities of the station. In recent years the Office has had the responsibility of coordinating the work of the Federal station and that of the station of the University of Puerto Rico in accordance with the provisions of the Act of March 4, 1931, under which the latter station now receives the benefit of funds provided by the Hatch and supplemental Acts.

The President approved on April 24, 1935, a Sugar Processing Tax Order allotting \$113,000 to the Federal Puerto Rico Station and between August 21 and October 24, 1935, seven such orders allotting a total of \$410,000 to the former Federal Hawaii Station. These allotments were continued by the Supplemental Appropriation Act, fiscal year 1936 (49 Stat. 1116). The funds are available until expended. The allotments to the former Federal Hawaii Station were closed out during the fiscal year 1939. There is a small balance remaining on the allotment to the Puerto Rico Station which will be expended this fiscal year.

(c) INSULAR EXPERIMENT STATIONS

Appropriation Act, 1940.....	\$83,000
Budget Estimate, 1941.....	83,250
Increase.....	<u>250</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
Federal Experiment Station in Puerto Rico.....	\$67,240	\$83,000	\$83,000	---
Additional for administrative promotions.....	---	---	250	+ 250 (1)
Unobligated balance.....	5	---	---	---
Total appropriation....	67,245	83,000	83,250	+ 250

INCREASE

(1) The increase of \$250 in this item represents the additional amount estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

The agricultural experiment station maintained by the Department at Mayaguez, Puerto Rico, since 1902, was established to aid in the improvement and diversification of agriculture in the island.

Since 1935, the Agricultural Experiment Station of the University of Puerto Rico has been receiving gradually increasing Federal grants for agricultural research under the Puerto Rico Station Act of 1931. In accordance with the provisions of this Act, the work of the Federal and the University of Puerto Rico stations is coordinated. The Federal grants to the University of Puerto Rico station are enabling it to gradually assume increasing responsibility for needed research on the problems of concern to Puerto Rico alone, and the Department Station is thereby able to serve more as a Federal tropical station where all bureaus of the Department may be provided with facilities for study of problems requiring or profiting by research under tropical conditions.

During the fiscal year 1939 the Bureaus of Plant Industry and Entomology and Plant Quarantine, the Forest Service and the Soil Conservation Service of the Department of Agriculture, and the Puerto Rico Reconstruction Administration of the Department of the Interior have maintained activities at Mayaguez, using the facilities of the experiment station.

The work of the Puerto Rico station includes:

(a) Investigation of tropical insecticidal plants which are sources of rotenone, the insecticidal material which is highly toxic to many insects but

is harmless to human beings and domestic animals. This material has made possible, for many uses, insecticides which do not leave objectionable or harmful residues on the edible portions of agricultural products treated with the insecticide. These insecticides have been effective in controlling a number of different insects, and the indications are that their use will be extended to control other insect pests. An additional advantage in the use of these insecticides is that they do not cause toxicity in the soil as is the case when inorganic poison insecticides are used in large quantities. The value of rotenone as an insecticide is now firmly established, and its use is increasing, but world supplies are not adequate, it is expensive, and at present it occurs in nature at low concentrations. The work at the Puerto Rico Station has as its objectives increasing the concentrations of toxic substances in the plants, lowering the cost of production, and the development of a useful practicable agricultural enterprise.

(b) Studies of drug plants, particularly quinine, to develop a source within the territory of the United States. At the present time practically all the quinine used by the United States, both for the civilian population and the military forces, is obtained from the Dutch East Indies. There is no other drug which can be used as effectively in treating certain serious maladies. It is important that this country develop its own source of supply of quinine, in case the present market sources are closed. The Puerto Rico Station has introduced species of quinine-producing plants and has demonstrated that quinine trees can be grown in Puerto Rico. Studies are being initiated to determine the best species to plant, the optimum conditions of growth, the most economic means of production of quinine trees, and to obtain high yields of quinine from the bark. Investigations are under way to determine the possibility of developing domestic sources of other drugs now imported, such as cocaine, strychnine, and cajuput oil.

(c) Breeding work with vegetables for the production of improved varieties for the continental United States. With the twelve month growing season in Puerto Rico, such work can be pursued more rapidly there. For example, breeding work is being conducted with sweet potatoes, which do not flower in the continental United States and, therefore, do not afford the opportunity for cross-pollination here. Breeding of sweet corn for improved varieties is being accelerated under the long growing season in Puerto Rico. Similar work is under way for the production of cantaloupes in the winter and for the improvement of calabazas, which are native vegetables similar to our squashes and pumpkins.

(d) Entomological work conducted under the technical supervision of the Bureau of Entomology and Plant Quarantine, involving the introduction of beneficial insects into Puerto Rico for their colonization there and further introduction into the Continental United States, and studies of insect pests of tropical plants. Particular attention is devoted to those insects which are pests in this country as well as in Puerto Rico, such as insect pests of sweet corn, sugarcane, and tropical fruits.

(e) Plant introductions and studies to develop the most effective methods of propagating tropical and subtropical plants. An extensive collection of tropical and subtropical plants is maintained. These introductions

and collections, which are handled in cooperation with the Bureau of Plant Industry, hold possibilities of crop improvement for sections of subtropical agriculture in the United States.

Under Puerto Rico Tax Fund Order No. 5, approved April 24, 1935, by the President, \$113,000 was transferred to the Federal Experiment Station in Puerto Rico for experimentation in the propagation and breeding of tropical plants and studies of domestic animal parasites. This allotment was continued under the Supplemental Appropriation Act, fiscal year 1936, and is available until expended. These funds will be exhausted during the present fiscal year.

The work conducted in Puerto Rico for the benefit of the agriculture of the continental United States is also helpful to Puerto Rico, partly in solving its local agricultural production problems, and partly, perhaps, in developing new intensive industries, such as drug and insecticidal plants, to supply needs in the United States. The station is cooperating with the Government of Puerto Rico in its efforts to develop new agricultural enterprises for Puerto Rico.

With the discontinuance of the Federal Experiment Station in Hawaii at the close of the fiscal year 1938, all the Federal stations formerly maintained in Alaska, Guam, Hawaii, and the Virgin Islands have been closed and the only Department Station remaining will be the Puerto Rico station. The maintenance of one Department outpost station in the Tropics in behalf of agriculture of the continental United States facilitates the research work of a number of bureaus of the Department.

SUPPLEMENTAL FUNDS

Projects	Estimated obligations, 1941	Estimated obligations, 1940	Obligated, 1939
Payments for Agricultural Adjustment:			
Federal Experiment Station in Hawaii:			
Taro investigations.....	---	---	\$10
Liver fluke eradication.....	---	---	874
Rat abatement campaign.....	---	---	---
Development of truck farming and improvement of marketing facilities...	---	---	14
Development of livestock feed.....	---	---	345
Development of tropical fruits and nuts.....	---	---	12
Promotion of the poultry industry.....	---	---	239
Federal Experiment Station in Puerto Rico:			
Experimentation in the propagation and breeding of tropical plants and studies of domestic animal parasites	---	\$635	1,952
Total, Payments for Agricultural Adjustment.....	---	635	3,446

Projects	Estimated obligations, 1941	Estimated obligations, 1940	Obligated, 1939
<u>Special Research Fund:</u>			
Administration of payments to States under Title I, Bankhead-Jones Act of June 29, 1935.....	\$28,000	\$28,000	\$27,847
Administration, including the planning, programming, and coordination, of special research projects authorized by Title I, Bankhead-Jones Act of June 29, 1935.....	12,000	12,000	5,143
Administration, including the planning, programming, and coordination of special research regional laboratories authorized by Title I, Bankhead-Jones Act of June 29, 1935.....	10,200	10,200	489
Total, Special Research Fund.....	50,200	50,200	33,479
<u>Conservation and Use of Agricultural Land Resources (New Uses and Markets for Farm Commodities, Regional Laboratories and Surveys):</u> Planning and coordination of the program of the regional research laboratories authorized by Section 202 of the Agricultural Adjustment Act of 1938.....	17,000	12,000	6,313
Total, Supplemental Funds.....	67,200	62,835	43,238

PASSENGER-CARRYING VEHICLES

The amount of the authorization for the purchase of passenger-carrying vehicles for the Office of Experiment Stations during 1941 remains unchanged at \$750. This \$750 will permit the needed purchase of one new vehicle, which is a replacement, for use at the Puerto Rico Station. In the fiscal year 1941 a passenger-carrying automobile which was purchased in 1935 will be retired from service, dismantled, and the parts used as spare parts. This disposition of the old car will be more economical than trading it in on the new car for an estimated allowance of \$75.

The automobile is needed to afford facilities for the research staff of the Federal Experiment Station in Puerto Rico in conducting the work jointly and in coordination with that of the experiment stations of the College of Agriculture of the University of Puerto Rico as required by law. The investigations are located at the Federal station at Mayaguez, the insular stations at Rio Piedras and Isabela, the insular demonstration farms, and other places in the island. The prosecution of the joint research necessitates frequent trips of the Director and other members of the technical staff from Mayaguez to the other stations and to points throughout the island. The poor transportation facilities in Puerto Rico make it essential that automobiles be available so that the research work throughout the island will not be impeded.

SPECIAL RESEARCH FUND, DEPARTMENT OF AGRICULTURE

Appropriation Act, 1940..... \$1,400,000
 Budget Estimate, 1941..... 1,400,000

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)
1. Administration of payments to States under Title I, Bankhead-Jones Act.....	\$27,847	\$28,000	\$28,000
2. Special research projects, Department of Agriculture.....	644,058	672,000	672,000
3. Special research laboratories in major agricultural regions.....	697,122	700,000	700,000
Unobligated balance.....	30,973	---	---
Total appropriation.....	1,400,000	1,400,000	1,400,000

General.--Section 4, Title I, of the Bankhead-Jones Act (approved June 29, 1935) provides that 40 percent of the funds appropriated in any one fiscal year pursuant to that Title shall constitute the "Special research fund, Department of Agriculture", and shall be available for (1) administration of the provisions of the Act authorizing payments to States, Hawaii, Alaska, and Puerto Rico for research to be conducted by agricultural experiment stations; (2) special research projects approved by the Secretary of Agriculture and conducted by such agencies of the Department of Agriculture as the Secretary may designate or establish; and (3) the establishment and maintenance of research laboratories and facilities in major agricultural regions of the United States and the prosecution of research at such laboratories. Section 1 of the Act specifies that the work conducted under the Special Research Fund shall be "research into laws and principles underlying basic problems of agriculture in its broadest aspects; research relating to the improvement of the quality of, and the development of new and improved methods of production of, distribution of, and new and extended uses and markets for, agricultural commodities and by-products and manufactures thereof; and research relating to the conservation, development, and use of land and water resources for agricultural purposes."

Title I of the Bankhead-Jones Act authorizes appropriations for the Special Research Fund as follows: \$400,000 for the fiscal year 1936, \$800,000 for 1937, \$1,200,000 for 1938, \$1,600,000 for 1939, and \$2,000,000 for 1940 and for each succeeding fiscal year. The full amounts authorized were appropriated through the fiscal year 1938. The appropriation was \$1,400,000 for each of the fiscal years 1939 and 1940. The estimate for 1941 is \$1,400,000, which is \$600,000 below the amount authorized for that year.

1. Administration of payments to States under Title I, Bankhead-Jones Act.--The administration of the provisions of the Act which authorizes allotments to the States, Territories, and Puerto Rico is conducted along the same general lines as that of the previous Acts granting funds to the State experiment stations for research work (Hatch, Adams, and Purnell Acts). Such administration includes examination and approval of research projects in advance of the expenditure of funds, review of the work and expenditures at each station as a basis for certifying the respective States, Territories, or Puerto Rico to receive Federal funds, assistance in coordinating the research of the various stations and the research of the stations with that of the Department, reporting annually to the Secretary and the Congress on the work and expenditures under the Act, and close advisory relations with the State, Territorial, and Puerto Rican stations. During the fiscal year 1939, there were 818 active Bankhead-Jones projects, of which 162 were new or revised.

Administration of the payments to States authorized by the Bankhead-Jones Act differs from administration of the other Acts on a number of points including the following:

(a) No allotment of Bankhead-Jones funds can be made to a State, Territory, or Puerto Rico in excess of the amount the State, Territory, or Puerto Rico makes available from other than Federal funds for research during the year. The other Acts do not require the Federal funds to be matched by the States. Enforcement of this provision requires not only annual administrative examination of the work and expenditures under the allotments under the Bankhead-Jones Act, but also annual administrative examination of the work and expenditures under an equal amount of funds made available by the States from other than Federal sources and advanced for offset credit. In 1940 it will be necessary to examine the work and expenditures made under the Bankhead-Jones allotments totaling \$2,400,000 and to examine State accounts also totaling \$2,400,000.

(b) As a part of their research offset, the States, Territories, and Puerto Rico may include expenditures during the year for physical plant and equipment necessary for the prosecution of research. This provision requires administrative responsibility to ascertain that expenditures for physical plant and equipment advanced for offset credit are for research purposes.

(c) Under the terms of the Bankhead-Jones Act the funds authorized by the Act may be used for physical plant, including the purchase and rental of land, construction of buildings, and for the equipment and maintenance of such buildings without limitation as to the portion of the funds which may be used for these purposes. The expenditures, however, must be limited to those necessary for the research under this Act. It is the responsibility of the Office to approve such expenditures only in relation to the specific needs of the work conducted under the Bankhead-Jones grant funds.

When the Bankhead-Jones Act of June 29, 1935, was enacted there was agreement with the land-grant institutions as to the administration and the services necessary to make the legislation most effective. In this connection there was agreement that 2 per centum of the annual appropriation under Title I of the Act would be needed for this purpose. By ruling of the Comptroller General after the passage of the Act, the amount available for administration of the payments to States was limited to 2 per centum of the Special Research Fund, which is only 0.8 per centum of the total provided by Title I of the Bankhead-Jones Act.

For the fiscal year 1940 there is an increase of \$300,000 in the amount for payments to States under Title I of the Bankhead-Jones Act. The funds for administering these payments, by the Comptroller General's interpretation of the Act, are a part of the Special Research Fund. There is no increase in the Special Research Fund for the fiscal year 1940. The Office, consequently without any additional funds for administration this fiscal year, has an increase of \$300,000 in the Federal-grant Bankhead-Jones funds to be administered and a corresponding increase of \$300,000 in the offset funds to be examined.

2. Special research projects, Department of Agriculture.---Forty-eight per cent of the Special Research Fund is available to the Secretary of Agriculture for the major objective of enabling him to undertake "research into laws and principles underlying basic problems of agriculture in its broadest aspects." The work under this head includes planning, programming, coordinating, and the carrying out of such special research projects as the Secretary may authorize to be undertaken under this fund in a way to effectively integrate this research with research and other activities provided for in the regular appropriations to the Department. The Act requires that the research under this fund "shall be in addition to research provided for under existing law (but both activities shall be coordinated as far as practicable) and shall be conducted by such agencies of the Department of Agriculture as the Secretary may designate or establish."

The research bureaus of the Department cooperate in bringing before the Secretary problems suitable for research under the provisions of the Bankhead-Jones Act. From the combined suggestions and recommendations, the Secretary, with such advisory assistance as he may call for, selects the problems for research. These problems are assigned to a bureau, or bureaus, or to a group of specialists, for development of plans and estimates for the consideration of the Secretary before final decision is made as to the research to be undertaken. The projects finally decided upon are assigned to an existing bureau or bureaus, along with an allotment of funds to each bureau. A written project is prepared outlining the research to be undertaken and submitted for approval by the Secretary as required by the Act.

The Office of Experiment Stations is responsible for the development of the program for presentation to the Secretary, for general assistance in planning, directing, and supervising the work, and for the administration of the funds in accordance with the provisions of the Act. A total of 50 projects involving 10 bureaus is now under way. As many as 4 bureaus and 9 State stations are involved in a single project in an effort to coordinate the work with research provided for by other funds as specified in the Act.

In administering this fund so that it will be of maximum service to the research program of the Department, the aim has been to have a certain flexible character to it so that allotments may be made and adjusted on the basis of the changes in relative needs of the investigations which are under way and to provide opportunity for undertaking timely and meritorious projects as the need arises. To accomplish this objective the following administrative procedures are followed:

(1) In administering, budgeting, and using the Special Research Fund, no money is allotted to operating units until carefully written project plans, estimated expenditures, and cooperation are outlined in detail and approved by the Secretary.

(2) Part of the fund is held unallotted until after January 1 of each year so that the Secretary may undertake research on emergency problems that arise during the year.

Of the total of 74 projects which had been initiated under the Special Research Fund from its establishment in the fiscal year 1936 through the end of the fiscal year 1939, 31 or approximately 42 percent have been completed.

The following are presented as illustrations of the type of work undertaken under allotments from the Special Research Fund:

GRAIN STORAGE ON THE FARM. The ever normal granary, crop loan, and crop insurance programs have emphasized the need for complete and accurate information regarding the deterioration of grain under various storage conditions, both on the farm and in commercial-type elevators. Better storage facilities on the farm would aid growers in marketing their grain crops to advantage, in reducing losses from deterioration, and in securing credit on stored grain. The information needed includes the types of storage structures that will best preserve and improve quality, the maximum moisture content for safe storage for various periods, the development of effective methods for reducing moisture content, and the part played by micro-organisms in the deterioration of stored grains.

In order to collect information which might have practical value over a wide area, a study was organized under special research funds in which three bureaus of the Department and seven State experiment stations cooperated. The study has developed the fact that the moisture content of wheat is the most important factor in storage, the practical safe upper limit being less than 14 percent for farm storage for one year of wheat to be milled into bread flour. A lower moisture content is desirable for longer storage. Wheat for seed should have a moisture content several percent lower if storage for more than one year is contemplated. The spoilage of wheat of high moisture content is associated with the presence of fungi and bacteria and attempts to hold these organisms in check with chemical treatments were not fully satisfactory. Drying of moist wheat seems to be the most feasible control of spoilage.

Under conditions of low atmospheric humidity such as were found in North Dakota and Kansas, satisfactory drying of grain in bins was obtained by forced ventilation, and in favorable years wheat of 15 to 16 percent moisture was kept in good condition in bins having good natural ventilation. In Illinois drying by natural ventilation was unsatisfactory and forced ventilation only fairly satisfactory in most years and not dependable in wet years. . . . Because of the prevailing high humidity in Maryland neither natural nor forced ventilation was successful in reducing moisture content. Since excessive moisture content of wheat sometimes cannot be avoided because of weather conditions, portable grain driers are being developed and tested. Observations are being continued on about 12,500 bushels of wheat from the 1936, 1937, and 1938 crops to determine rates of deterioration under various storage conditions for extended periods of time.

A recent development in the problem of grain storage on the farm may be cited as an illustration of how the Secretary is enabled by the Special Research Fund to provide for an immediate, timely attack upon some problems which arise during the year, especially in connection with the administration of acts basic to the welfare of agriculture in its broadest aspects. Considerable thought had been given by farmers and by representatives of the Department and State colleges concerning the question of making loans on grain sorghum in the southern Great Plains area as a means of stabilizing livestock feed supplies and livestock production in that area. Recommendations that this be done had reached the Department. Meantime, some of the best-qualified State and Federal men familiar with problems of grain sorghum had advised as to probable difficulties and losses in the storing of grain sorghum without further information as to requirements for storage. The question itself and the amount which might be involved in such loans and the probable difficulties, perhaps losses, seemed to merit such immediate action as might be taken to secure facts before the 1940 harvest season. With a relatively small amount of special research funds, a project was started about March 1, 1939, under definite plans in cooperation with State experiment stations to use facilities available and secure helpful facts before the fall harvest.

IMPROVEMENT OF WEATHER FORECASTING. Efficiency in agricultural planning to produce the "ever normal granary" cannot in every case be as effective as is desirable because meteorological factors such as droughts, excessive rains, damaging storms, etc., may have a profound effect on agricultural production. Improved weather forecasting of short- as well as long-range character would lead to better fore-knowledge of crop prospects and serve as an important aid in agricultural planning. The basic importance of extending knowledge of the behavior of weather was recognized in the establishment of investigations under special research funds by the Department in cooperation with several leading educational institutions. The work has been conducted along two lines - (1) a critical appraisal of existing methods of short- and long-range weather forecasting from both a statistical and physical basis, and (2) the inauguration of fundamental research in meteorology designed to furnish an understanding of weather essential to the development of practical methods of long-range forecasting.

The appraisal of existing methods of forecasting has been completed and has indicated the probability that the method of Dr. Franz Baur can be adapted for 5- and 10-day forecasts in America. A study of charts of the northern hemisphere and of observed meteorological conditions has suggested certain relations which have been used as a basis for formulating empirical forecasting rules. These have been applied with some success.

Studies of the physical processes involved in the development of cold waves in North America have been concerned with the enlargement of certain theoretical concepts of the formation of large masses of cold air in northern Canada and Alaska. In order to verify these concepts, upper air observations by airplane and radiosonde balloons were conducted at Fairbanks, Alaska, and Ft. Smith, Canada. The results of these studies have led to a fairly complete understanding of the method of formation of cold air streams from which principles have been evolved leading to more accurate forecasts of the southward sweep of cold air masses. A better understanding of summer weather has been attained through the use of the isentropic chart which gives a representation of both horizontal and vertical air flow. By means of this chart and analyses based on airplane and radiosonde observations, it has been demonstrated that the circulation in the upper atmosphere has more of an eddy character than was heretofore supposed. A promising beginning has, therefore, been made in improving the accuracy and extending the range of forecasts of summer as well as winter weather conditions.

Although much remains to be learned in the complex field of weather behavior, the studies made possible by the Special Research Fund have already contributed considerable new data of a fundamental character.

SHEEP FOR SOUTHWESTERN RANGES. The prime requisite in sheep for much of the range country of the southwest is ability to exist and thrive under very hard conditions. In this respect Navajo sheep are superior. Tracing back to early Spanish importations, they have developed the characteristics of hardiness to a marked degree through many generations of natural selection on the Navajo reservation. In their capacity to maintain themselves on the sparse vegetation of the desertlike ranges of northeastern Arizona and northwestern New Mexico, and their ability to withstand the cold winters of the high ranges, they have greatly excelled improved breeds of recent introduction. They are inferior, however, in carcass quality and the yield of wool is low. Aside from the quality of hardiness, the Navajo sheep have other characteristics useful in genetic analysis, such as kemp and other traits of the wool that are no longer present in improved sheep. The further perfection of the desirable qualities of the Navajo sheep, and the combination of these with the good qualities of improved breeds, would benefit sheep breeders in many regions of the western United States, as well as more nearly meet the economic requirements of the Navajo Indians.

With these objects in mind a study was undertaken under an allotment from the Special Research Fund to the Bureau of Animal Industry to provide for technical leadership and guidance. The work is cooperative with the Soil Conservation Service which advises concerning the sheep-carrying capacity of the ranges used for the study and assists in providing additional range lands

as needed, and with the Office of Indian Affairs of the Department of the Interior which provides sheep and facilities and the major part of the general operating expenses of the investigations.

The first aim in the work has been the production of sheep having fleeces well suited for Indian handicrafts which might also find a ready outlet for commercial markets. The testing of commercial suitability of various wool types that have been used in experimental hand weaving is in cooperation with the Bureau of Prisons of the Department of Justice.

A noteworthy finding to date has been that a carefully planned management program carried out over a period of three years has resulted in marked improvement in growth rate and size of lambs. These qualities were not apparent in the foundation flock under the hard conditions of Indian management. The need for improved management practices on the ranges of the region was therefore indicated.

Technological studies are pointing the way for the breeding program by defining the physical characteristics of wool best suited for hand weaving. They have shown that crosses between Navajo sheep and fine wool sheep do not produce desirable wool for this purpose, and that the characteristics of wool used in making Navajo blankets 60 to 80 years ago were similar to the wool of pure Navajo sheep now in the experimental flock. This wool when used by the Navajo weavers and in schools of the area has been made into rugs which were rated by competent judges as the best produced during the past 40 years.

3. Special Research Laboratories in Major Agricultural Regions.--

The Bankhead-Jones Act provides that the Secretary of Agriculture shall use one-half of the Special Research Fund for the establishment and maintenance of research laboratories and facilities, and for research as described by the act at such laboratories, at places selected by the Secretary in major agricultural regions. The work under this item involves decision as to problems for which laboratories should be established and planning the research program for each such laboratory; the working out of relationships with the State experiment stations in the major agricultural region having such a laboratory, or where such a laboratory is proposed, in order to coordinate this work with work under regular Federal and State activities; and carrying forward the research program finally approved.

The laboratory provision in Section 4 of the Bankhead-Jones Act was originally initiated by the States through the Land-Grant College Association. The objective was to provide for a cooperative Department and State experiment station attack, regional or national in scope, and beyond what might reasonably be expected as an undertaking for any individual State without endangering the ability of the State experiment station to meet the problems primarily of State and local concern. In view of this fact, the procedure adopted by the Secretary in the establishment of such laboratories is as follows:

(1) Joint recommendations for laboratory projects having national as well as outstanding regional importance are received by the Secretary

from the directors of the State agricultural experiment stations of the respective regions as to problems which are agreed upon as of first importance to each of the regions, along with similar suggestions from subject-matter bureaus of the Department, viewing the needs of agriculture from the national and interregional point of view. The problems submitted are to be of sufficient regional importance that the State experiment stations may, without reservation, cooperate with the Department in developing participating regional programs for which the laboratories serve as focal centers.

(2) From these suggestions projects are tentatively selected for further joint consideration by specialists of the Department and the State experiment stations of the region involved. The research program is jointly and carefully planned to determine physical plant and budgetary requirements, and cooperative participation of all agencies concerned in order that the project may be effectively initiated and carried forward. As far as practicable, the location of the regional laboratories is selected by agreement at existing State or Department experiment stations so as to avoid duplication of equipment and personnel and to promote in every way coordinated, cooperative action.

(3) On the basis of the development outlined in the preceding paragraphs, the Secretary of Agriculture selects the project to be finally approved.

(4) A definite written project outline is prepared explaining the problem to be studied and the plan of attack.

(5) A written memorandum of understanding covering the cooperative relationships of all agencies which will participate in the project is formulated and agreed to in writing by all the participating agencies.

(6) Funds for the project are allotted to the appropriate subject-matter bureau or bureaus of the Department only by the Secretary's written approval of the project outline, in accordance with Section 4 of Title I of the authorizing Act.

(7) To provide for continuous and effective joint action in planning and carrying forward the cooperative regional laboratory program, including the work of the laboratories and the related work of the Department and of the State stations, a designated representative of each State station in the region and representatives of the Department meet at least once annually at the regional laboratory under consideration to carefully review the progress of the past year and to formulate the research program for the succeeding year in the best interest of agriculture in the individual States, in the region, and in the Nation as a whole. For each laboratory the representatives of the State stations are selected from the outstanding specialists of the experiment stations within the subject matter field of the laboratory to act as collaborators with the laboratory, each station designating one collaborator for each laboratory in the region. Each State station contributes the salary of its designated collaborators for whatever time is devoted to the cooperative program

throughout the year, including participation in the review of the work and in the formulation of plans for the future. The laboratories defray the travel expenses of the collaborators when they are requested to meet, usually once annually, for review of the work and assistance in developing the program.

The Office of Experiment Stations is responsible for the development of the laboratory programs in cooperation with bureaus and State stations, to be presented for the consideration of the Secretary, for assistance in the general planning of the work and the development of effective relationships at each laboratory, and for the administration of the laboratories in accordance with the terms of the act.

In accordance with the policy outlined above nine laboratories have now been established, with the cooperation and participation of all of the State agricultural experiment stations in each of the regions in which the laboratories are located. A description of each of these laboratories follows:

REGIONAL LABORATORY FOR RESEARCH INTO THE HEREDITY AND BEHAVIOR OF VEGETABLE CROP PLANTS FOR THE DEVELOPMENT OF IMPROVED VARIETIES HAVING SUPERIOR ADAPTATION TO THE SOUTHEASTERN REGION OF THE UNITED STATES; approved by the Secretary, November 30, 1935; located at Charleston, South Carolina; in cooperation with 13 State agricultural experiment stations of the region.

The need for better varieties and strains of vegetables for the Southeastern States has become particularly apparent in recent years. The value of the vegetable crops of the region, not including white potatoes and sweetpotatoes, is about \$80,000,000 annually. In general, the best varieties now available are rather poorly adapted to meet the hazards of diseases and insect pests and the climate and soil conditions peculiar to the Southern States. The problem of meeting market demands as to quality and of keeping down losses from spoilage has become increasingly difficult.

The directors of 13 State experiment stations and representatives of the Department planned a coordinated program whereby the laboratory assembles breeding material of the leading vegetable crops, selects and purifies the most promising strains, studies the inheritance of desired qualities, and produces new varieties through breeding and selection for use in the region as a whole. The ultimate testing, selection, and improvement of varieties and strains for local conditions within the region is the function of the State stations.

A great deal of potentially valuable plant material has been assembled and studied at the regional laboratory. Progress has been made (1) in selecting inbred lines of sweetcorn resistant to the corn earworm, each crop in three successive years having shown increasing resistance; (2) in developing market types of snapbeans resistant to bacterial blight; (3) in producing high quality tomatoes resistant to *Fusarium* wilt and in developing strains showing promising resistance to *Macrosporium* defoliation and fruit cracking; (4) in isolating varieties of cabbage having a high degree of cold resistance for the development of new market types;

(5) in producing strains of peas resistant to Fusarium wilt which will be released as new varieties.

Fundamental advances have also been made in working out special breeding methods and in determining the method of inheritance in water-melons of such characters as size, color of flesh, and color and size of seed. These facts will provide the essential tools for developing new types needed by the growers of watermelons.

REGIONAL LABORATORY FOR RESEARCH INTO LAWS AND PRINCIPLES UNDERLYING PASTURE IMPROVEMENT IN THE NORTHEASTERN REGION; approved by the Secretary, February 20, 1936; located at State College, Pennsylvania; in cooperation with 12 States of the region.

This laboratory was the outgrowth of a recommendation from the directors of experiment stations in 12 Northeastern States in which the improvement of pastures was considered to be the most pressing problem of the Northeastern region. In this great market-milk area there has been a steady decline in the carrying capacity of pastures. Better pastures are needed to provide cheap sources of feed, and to aid erosion control and watershed protection. In the program of the dairy farm, pastures afford the cheapest source of feed and produce the most profitable returns.

Among the several phases of pasture improvement work considered, it was decided that the laboratory could best serve the interests of the region by obtaining basic facts leading to the breeding and selection of superior pasture grasses and legumes and by helping to coordinate the pasture research work of the region as a whole. The grasses are near relatives to the cereals which have been greatly improved through the use of modern breeding methods and would appear to offer similar possibilities.

In carrying out the program, over 30,000 individual plants have been grown and examined for characteristics of possible pasture value. The material includes individual plants of Kentucky bluegrass, Canada bluegrass, white clover, rye grass, timothy, orchard grass, and the bent grasses obtained throughout the region and from other sources. Wide variations in type of growth, chemical composition, disease resistance, and plant food requirements are apparent among the different individual plants. It has been found, for example, that (1) individual plants of Kentucky bluegrass may vary as much as 100 percent in crude protein content, (2) that individual plants of white clover may vary in their content of hydrocyanic acid from 0 to 500 p. p. m., but toxicity to animals has not yet been demonstrated, and (3) that white clover plants also may vary widely in their lime and phosphorus requirements when grown in soil cultures.

The work at the laboratory has indicated that certain environmental factors tend to induce heading of Kentucky bluegrass, orchard grass, Canada bluegrass, and timothy.

A beginning has been made in establishing inbred lines of both grasses and legumes and a means of speeding up the breeding program has resulted from the discovery of a method for inducing germination of freshly harvested

Kentucky bluegrass seed.

As improved varieties of pasture species are developed, arrangements will be made for testing them in various localities of the region, since it is not likely that strains produced in any single location will be suited to the entire region. Problems relating to seed production and the maintenance of the purity of strains will need to be solved before commercial use can be made of such improved strains as are produced.

REGIONAL LABORATORY FOR RESEARCH INTO THE INDUSTRIAL UTILIZATION OF THE SOYBEAN AND SOYBEAN PRODUCTS IN THE NORTH CENTRAL REGION OF THE UNITED STATES; approved by the Secretary, February 20, 1936; located at Urbana, Illinois; in cooperation with 12 States of the region.

The increasing importance of the soybean in both agriculture and industry, as indicated by the fact that the acreage now planted to this crop is nearly twice that of 10 years ago, has focused attention on problems related to industrial uses for soybeans and soybean products. Since this field of study seemed to offer great possibilities for new and extended uses and markets for a major farm commodity, a laboratory for investigations under special research funds was established at Urbana, Illinois, under cooperative arrangements with the University of Illinois. Two bureaus of the Department and 12 experiment stations of the North Central region are cooperating in the work.

Because of its high content of oil and protein, the soybean is adapted to a wide variety of industrial uses and the work of the laboratory has been directed to the extension of these uses through basic research and to testing and improving the quality and adaptability of types and varieties of soybeans for industrial use through selection and breeding.

Results of interest and value include the development of paints, varnishes, and certain types of enamels prepared from soybean oil which have shown excellent qualities under continued tests. More rapid drying of soybean oil and harder films are being worked out through the use of acid anhydrides. New plastics have been produced by mixing hardened soybean meal with resins. They have a wide range of brilliant colors, are translucent, and can be removed finished from the hot die. A very cheap and strong laminated board has been made by impregnating kraft paper with soybean meal and pressing the sheets together. A dispersion of soybean meal in formaldehyde has been prepared and is now used commercially as a tub size for paper. A plastic with leather scrap filler has been developed with the formaldehyde dispersion. There is a wide potential field of applications for these new products and a great deal of commercial interest is being shown.

Using a new method developed at the laboratory, the iodine number of freshly pressed soybean oil can now be determined with a single drop in 5 minutes. The former method required weighing, a half-hour's reaction time, and a titration. The urgent need of industry for data on operating variables such as fineness of material, moisture content, pressure, and temperature is being met by studies on a semi-commercial scale of expeller pressing operations.

Stigmasterol, a chemical in demand by pharmaceutical manufacturers and heretofore imported in the crude form from Germany, has been isolated and a successful plant scale method for its production has been developed.

Little is known of the phosphorus and nitrogen compounds of the soybean and the laborous fractionation work now in progress may lead to the discovery of compounds with unique and valuable properties.

Comprehensive tests during 3 years at various points in the region show that soil and climate have an important influence on the composition of soybeans and that the range in chemical composition due to variety is of about the same magnitude as the range in composition due to environment. The search for improved varieties with higher qualities for industrial uses, involving observations on 1,300 crosses and 30,000 hybrids, indicates that it will be possible to develop improved types through selection and hybridization.

REGIONAL LABORATORY FOR THE IMPROVEMENT OF SWINE THROUGH THE APPLICATION OF BREEDING METHODS IN THE NORTH CENTRAL REGION; approved by the Secretary, December 22, 1936; located at Ames, Iowa; in cooperation with 12 States of the region and with Oklahoma.

The swine industry is one of the Nation's major agricultural enterprises. It normally produces about 10 percent of the national farm income and about 23 percent of the farm income of the Corn Belt States. Practical breeders and scientists are agreed that the economic development of this important industry is limited by lack of knowledge regarding the behavior of hereditary characters in swine and the merits of different systems of breeding. Noteworthy advances leading to greater economy in production and improvement in the quality of pork and pork products should result from the discovery of new fundamental information concerning the breeding of swine.

Under the coordinated plan of research established in the North Central region, improvement is being sought in productiveness of sows, growth rate of pigs, economy of gains, physical vigor, and quality of carcass. The central unit is at Ames, Iowa, in cooperation with the Iowa Station, and phases of the work are in progress at the Illinois, Minnesota, Missouri, Nebraska, and Oklahoma Stations. The breeding work at this time involves over 500 breeding animals. Some 450 litters were farrowed this spring and approximately 200 litters were farrowed this fall.

The high individual merit and the performance of certain of the lines at this time are encouraging. Some of the most advanced lines will be crossed during the current year in search of combinations that may raise the general level of performance within the breed.

Progress in forming new strains through combinations of 2 or more breeds is promising. The stock resulting from crosses of the Danish Landrace and Tamworth breeds at the Minnesota Station has performed well, and the records of the first stock slaughtered indicate that the carcasses have exceptionally high merit.

REGIONAL LABORATORY FOR THE IMPROVEMENT OF SHEEP FOR WESTERN RANGES THROUGH THE APPLICATION OF BREEDING METHODS IN THE FAR WESTERN REGION; approved by the Secretary, February 24, 1937; located at Dubois, Idaho; in cooperation with 12 States of the region.

The sheep industry of the western range area has passed the pioneer phase and further progress is dependent upon the development of strains of sheep more efficient in lamb and wool production than those now in existence. The economic utilization of grazing lands of this area requires the production of sheep and wool. The area contains about two-thirds of the breeding sheep of the United States and supports one of the most important of the Nation's agricultural enterprises.

The program is designed to further the development of strains of sheep superior to those now existing in hardiness, and yield and quality of wool and lambs, and to coordinate the research of the regional laboratory with the related research of 12 cooperating State experiment stations and of the Department. Close inbreeding, moderate inbreeding, and selection based on the use of proved sires are being followed in the development of new strains of the Rambouillet breed.

The evidence indicates that sheep which have been carefully selected for a number of generations and inbred to a mild degree are breeding more uniformly and producing lambs with desirable wool qualities. The extent to which further inbreeding will result in further improvement will be determined.

Special matings have been made in one case to improve mutton qualities; in another case, to increase the length of staple; and, in a third case, to emphasize the open face character so important in range sheep. Promising results have been obtained in all three cases.

The necessity of exercising care in locating suitable foundation rams is apparent. In full appreciation of this problem, the program is being enlarged making it possible to speed up the search for rams that will prove desirable. Basic studies dealing with the physiology of reproduction and of the physical and chemical properties of wool fibers are being developed.

REGIONAL LABORATORY FOR STUDY OF THE MECHANISM OF INFECTION IN THE CONTAGIOUS, INFECTIOUS, AND PARASITIC DISEASES OF DOMESTIC ANIMALS AND POULTRY, AND METHODS OF CONTROL IN THE SOUTHEASTERN REGION; approved by the Secretary, February 24, 1937; located at Auburn, Alabama; in cooperation with 13 States of the region.

Under practical conditions, the factors that seemed to favor livestock production in the South have also favored the development of diseases and parasites. Losses from these causes have greatly hindered attempts to diversify southern agriculture, including livestock and poultry populations.

The urgent need that exists for more knowledge regarding the nature and control of diseases and parasites of livestock and poultry in this

region was recognized by representatives of 13 experiment stations of the Southeastern States and the Department in planning a coordinated program of fundamental research. It was decided that the first work undertaken should deal with Johnes's disease of cattle, bovine coccidiosis, and bovine internal parasites.

Since the laboratory building has only recently been equipped and the staff only recently assembled, significant results have not yet been obtained. The major object of the work being done on Johnes's disease is to find some accurate and satisfactory method of diagnosing the disease in its early stages before the infected animals have become dangerous as spreaders. An attempt to use small animals in preliminary experiments shows most promising results. If this succeeds, the investigations may be pushed forward more rapidly than would be possible if large animals had to be employed. Encouraging progress is being made in finding a satisfactory medium for the growth of the bacteria responsible for Johnes's disease.

The species of coccidia reported as occurring in cattle and four previously unidentified species have all been found in the vicinity of the laboratory and studies of these parasites and their effects on calves are under way. Attempts are being made to rear calves under special conditions free from coccidia. It was found that calves uniformly became infected when removed from their dams a few hours after birth, kept on concrete floors cleaned daily, and fed whole milk from a commercial dairy.

Examinations of young cattle to determine the kind of parasites present have indicated the regular presence of the stomach worm, Haemonchus contortus, one of the most serious parasites of the region, and also most of the round worms reported to occur in cattle in North America. The relation between the presence of these parasites and anemia is under investigation. This involves studies of the normal blood of calves and young cattle on which little information is available. In preliminary work, well-fed calves have not as yet shown any clinical symptoms following exposure to the stomach worm. Studies of the blood have shown that calves apparently failed to exhibit clinical symptoms of oedema in the submaxillary space unless the volume of red blood cells sinks to the level of 20 percent of the total blood volume.

Experiments to determine the longevity of parasite eggs and larvae on pastures under normal conditions are under way as a possible aid in the control of parasites through rotation of pastures.

REGIONAL LABORATORY FOR RESEARCH TO IMPROVE THE VIABILITY IN POULTRY IN THE NORTH CENTRAL AND NORTHEASTERN REGIONS; approved by the Secretary, December 23, 1957; located at East Lansing, Michigan; in cooperation with 25 States of the two regions.

Fowl paralysis is prevalent on both commercial poultry farms and diversified farms. It has been estimated that a loss of nearly \$100,000,000 occurs annually in the Northeastern and North Central States, approximately one-half of which is claimed to be due to this disease. Heavy financial losses are incurred not only from deaths but also through a reduction in the number of eggs produced.

At the present time there is inadequate knowledge concerning the nature of fowl paralysis and no effective methods for its control are known. A research program sufficiently broad to permit the investigation of all phases of the problem such as would lead to the development of effective control measures is essential to the welfare of the large poultry interests of the Nation. An effective program should include studies of the pathologic and genetic aspects of fowl paralysis and of the effects of different management practices, nutrition, and parasitism on its occurrence.

In developing plans for a coordinated attack, representatives of the experiment stations of the 25 States comprising the Northeastern and North Central regions and the Department representatives recommended that first consideration be given to attempts to determine the parasitic causative agent, or agents, responsible for fowl paralysis and to determine to what extent breeding for resistance can be successful. Investigations along these lines are, therefore, being developed at the regional laboratory at East Lansing, Michigan, which will serve as a focal center for the work of the two groups of States.

At this time a central laboratory building and 4 poultry buildings have been erected on 50 acres of land deeded by the Michigan State College. Members of the staff are now being assembled, and the first stages in the research program have been started.

REGIONAL LABORATORY FOR INVESTIGATIONS OF THE RELATIONSHIPS OF THE SALINITY OF IRRIGATION WATERS, AND OF SOIL CONDITIONS, TO PLANT GROWTH AND RELATED FACTORS INVOLVED IN A PERMANENTLY SUCCESSFUL IRRIGATED AGRICULTURE IN THE WESTERN REGION; approved by the Secretary, December 23, 1937; located at Riverside, California; in cooperation with 11 States of the region and the Territory of Hawaii.

Throughout the Western States and Hawaii there are nearly 20,000,000 acres devoted to irrigation farming. On approximately one-half of this area the productivity of the land is seriously impaired or threatened by excessive accumulation of soluble salts or alkali. There are also extensive areas of lands suited for irrigation that are naturally saline and from which the salts must be removed before they can be used for crop production. Already extensive acreages have been abandoned or their production seriously impaired. As great as these losses are it is believed that they are relatively small when compared with those sustained but not recognized as due to salt injury. The progress of salt accumulation is often slow, and injurious effects may not be recognized until the productivity of the soil has become seriously affected. Our present knowledge does not always permit the clear separation of salt injury from injuries caused by other factors.

Joint consideration of this problem by representatives of the Department and 11 Western States and Hawaii led to the formulation of a program of research designed to supplement and integrate the work being done by the several agencies and to provide for fundamental studies having regional application such as would exceed the resources of the individual States. A portion of the Rubidoux Laboratory at Riverside, California,

was made available to the Department on a long-term lease by the University of California, and 9.5 acres of adjoining land were purchased as the headquarters for the work of the regional laboratory established under special research funds. The necessary additional buildings and equipment, including 2 greenhouses, a head house, and other small buildings, have been completed, and the experimental work has been started. Studies will be made of (1) the tolerance of economic plants of the West to salts found in irrigation water and soils of irrigated areas, (2) the effect of continued irrigation on the physical nature of the soil and its productivity, (3) the mechanism of salt injury, and (4) the symptoms of injury resulting from excessive salt concentrations. The irrigation practices necessary to avoid harmful salt concentrations and the possibilities and limitations of drainage as a reclamation practice will receive thorough consideration.

REGIONAL LABORATORY FOR RESEARCH INTO THE RELATION OF SOILS TO PLANT, ANIMAL, AND HUMAN NUTRITION; approved by the Secretary, January 31, 1939; located at Ithaca, New York; in cooperation with 12 States of the North-eastern region.

In recent years special attention has been given to the effects on man and animals when plant or animal products grown in certain soil areas were used as food. In some cases physiological disorders common among man and animals in certain sections do not occur in other sections of the country. Some soils contain undesirable elements which inhibit the growth of plants and affect adversely the growth of animals.

Knowledge of the number of mineral elements of biological significance has increased notably in recent years. At the same time, additional and important functions have been ascribed to some that long have been known to be essential.

The roles of such elements as calcium, phosphorus, sulfur, sodium, and chlorine, used in relatively large amounts by animals and man, have been fairly well understood for many years. Another group of elements is equally essential although needed in only small amounts. The number of elements in this group has been added to steadily. At present, iron and copper appear necessary for haemoglobin formation, cobalt to some extent also and for correcting the so-called "Bush disease" of cattle in some areas; iodine for normal functioning of the thyroid, manganese for reproduction (also prevents perosis in chickens), magnesium for normal functioning of nerves, and zinc for reasons not well understood. The status of a rather long list of elements remains in doubt, chiefly because of insufficient study.

Many or all of these elements are generally supplied to the body through plants consumed as food. The dietary and nutritional disturbances caused by their lack are observed only when they are not present. In past years a sufficient amount of these elements was present in most soil in quantities large enough to supply the needs of the plants and also the animals which ate them. More recently as additional regions have been opened to crop production some of them have been found to be deficient in certain elements, and the meager supply in other soils has been so reduced through crop removal with no replenishment that the results caused by such deficiency

cies are now becoming acute. The whole problem becomes one in urgent need of investigation for populations of men and animals, especially so because it has been found possible to replenish these elements through direct application of fertilizers containing them and through other agricultural practices.

In view of these facts after several years' careful consideration the Secretary approved July 1, 1938, a regional laboratory project contingent upon the submission of a project outline which would give promise of developing an integrated, cooperative, coordinated, regional and perhaps national investigation of this important subject. After the project outline had been developed to the satisfaction of the Secretary, it was considered by the experiment station directors of the Northeastern region and was approved most heartily as a cooperative study.

Cornell University deeded to the Department approximately 2 1/4 acres of land on its campus as a site for greenhouses, laboratories, etc. Utility lines have been practically completed. The construction of one wing of the laboratory building is well advanced and work has been started on the second wing.

PASSENGER-CARRYING VEHICLES

It is estimated that probably three passenger-carrying automobiles will be required in the fiscal year 1941 in connection with the work conducted under the Special Research Fund, one, which is a replacement, for regional laboratory projects under Section 4 of the Bankhead-Jones Act of June 20, 1935, and two for projects under Section 1 of the Act. The automobile to be replaced has been in constant use since 1936. The cars to be purchased, of course, are subject to the limitation of \$750 maximum cost applicable to the Government as a whole.

At least one car is essential for each regional laboratory to enable the technical men to visit the different parts of the region, including the State experiment stations located therein, all of which are cooperating in the laboratory projects of their region. In the case of laboratories established in the larger regions covering a wide area, those involving extensive cooperative relationships and those including the work of more than one bureau, two or more cars may be required to enable the technical men to visit the different parts of the region. Automobile transportation is also necessary in connection with field projects conducted under this fund in the case of those investigations for which common carriers are not available, are impracticable, or are less economical.

EXTENSION SERVICEPayments to States, Hawaii, Alaska, and Puerto Rico
for Agricultural Extension Work.General Statement

As shown by Table 1, on the following page, funds available in 1940 for direct payments to the States, Hawaii, Alaska, and Puerto Rico for cooperative agricultural extension work total \$18,470,583. In addition, as shown by Table 1, there is available \$114,060 from appropriations direct to the Department of Agriculture, making a grand total of \$18,584,643 available to the States and Territories for 1940. As shown also by Table 1, the Budget Estimates for 1941 provide for total appropriations of \$18,650,143 for these purposes, involving a total increase of \$65,500 (\$63,000 for Puerto Rico and \$2,500 for Alaska) as compared with 1940. The various increases in appropriation and allotment items are discussed on succeeding pages.

With the exception of funds provided under the Clarke-McNary Forestry Act of 1924, and the Norris-Doxey Cooperative Farm Forestry Act of 1937, which are disbursed directly by the Department, Federal funds for cooperative agricultural extension work are allotted and paid directly to the States, Hawaii, Alaska, and Puerto Rico in accordance with the provisions of the several different basic authorization acts. (See Table 2.)

The use of all of these funds is indicated in greater detail in Tables 1, 2, 3, 4, and 5. Table 1 is a summary of all the funds available to the States and Territories. Table 2 indicates the estimate of direct payments to the States and Territories for 1941 indicating those which require offset by State, county, or local funds, those where such offset is not required, and the basis of allotment. Table 3 shows, by States, the allotments available to States and Territories for 1940 and 1941 as contemplated by the Budget estimate. Table 4 shows, by States, Federal funds and funds arising from sources within the respective States. Table 5 shows the various classes of field agents employed with extension funds.

Table 1.

Statement showing appropriation items and amounts available to the States in 1940 and estimated for 1941.

Item	Appropriation, 1940	Budget estimate, 1941	Increase
Payments to States, Hawaii, Alaska, and Puerto Rico for agricultural extension work:			
Permanent Specific Appropriation:			
Smith-Lever Act	\$4,701,165	\$4,701,165	-
Agricultural Appropriation Act:			
Capper-Ketcham Act	1,480,000	1,480,000	-
Extension work, Act of April 24, 1939	203,000	203,000	-
Extension work, section 21, Bankhead-Jones Act	12,000,000	12,000,000	-
Alaska Acts	21,418	23,918	+ \$2,500
Puerto Rico Act	65,000	128,000	+ 63,000
Total, Agricultural Appropriation Act	13,769,418	13,834,918	+ 65,500
Total payments made directly to States and Territories	18,470,583	18,536,083	+ 65,500
Amounts allotted to States and Territories, but disbursed by Department of Agriculture:			
Cooperative farm forestry exten- sion work (Clarke-McNary Act of 1924)	71,480	71,480	-
Cooperative farm forestry (Norris-Doxey Act of 1937)	42,580	42,580	-
Total allotments to States and Territories	114,060	114,060	-
Total direct payments and Department allotments to States and Territories .	18,584,643	18,650,143	+ 65,500

Table 2.

Statement of direct payments to States, Hawaii, Alaska, and Puerto Rico, indicating those requiring offset by States and Territories, those not requiring such offset, and basis of distribution, as estimated for 1941.

Item	Total estimate, 1941	Amount to be paid without offset	Amount requiring offset and basis of allotment	
			Amount	Basis of distribution
(1) Permanent annual appropriation (Smith Lever Act) ..	\$4,701,165	\$500,000(a)	\$4,201,165	Rural population
(2) Capper-Ketcham extension work	1,480,000	980,000(b)	500,000	" "
(3) Extension work, Act of April 24, 1939 ..	203,000	203,000	-	Determined by Secretary of Agriculture
(4) Extension work, section 21, Bankhead-Jones Act	12,000,000	12,000,000(c)	-	Farm population
(5) Alaska	23,918	20,000(d)	3,918	Rural population
(6) Puerto Rico	128,000	128,000	-	Specified by law
Total, direct Federal payments	18,536,083	13,831,000	4,705,083	

(a) \$10,000 to each State, Hawaii, and Puerto Rico.

(b) \$20,000 to each State, and Hawaii.

(c) \$20,000 to each State, and Hawaii (balance based on farm population)

(d) \$10,000 to Alaska (Act of Feb. 23, 1929).

\$10,000 to Alaska (Act of June 20, 1936).

Funds from other sources

The Federal funds for cooperative agricultural extension work, for fiscal year 1940, \$18,584,643, are supplemented by funds from within the States estimated at \$14,190,453, thus making available from Federal, State, and local sources, an approximate sum of \$32,775,096 for extension work.

See Table 3 for Federal allotments to States and Territories for fiscal years 1940 and 1941.

See Table 4 for extension funds from all sources by States and Territories for fiscal year 1940.

Table 3.
ALLOTMENTS TO STATES AND TERRITORIES
FEDERAL FUNDS FOR COOPERATIVE AGRICULTURAL EXTENSION WORK
(INCLUDING CLARKE-MONARY AND NORRIS-DOXEY EXTENSION ALLOTMENTS)

State	Appropriation, 1940	Budget Estimate, 1941	Increase
Alabama.....	\$ 700,282.82	\$ 700,282.82	-
Arizona.....	117,005.21	117,005.21	-
Arkansas.....	580,410.37	580,410.37	-
California.....	406,587.96	406,587.96	-
Colorado.....	214,938.52	214,938.52	-
Connecticut.....	131,490.02	131,490.02	-
Delaware.....	76,598.09	76,598.09	-
Florida.....	223,033.77	223,033.77	-
Georgia.....	736,318.71	736,318.71	-
Idaho.....	156,847.74	156,847.74	-
Illinois.....	581,835.90	581,835.90	-
Indiana.....	467,592.67	467,592.67	-
Iowa.....	533,134.33	533,134.33	-
Kansas.....	403,995.92	403,995.92	-
Kentucky.....	630,340.60	630,340.60	-
Louisiana.....	460,996.85	460,996.85	-
Maine.....	157,686.44	157,686.44	-
Maryland.....	196,957.15	196,957.15	-
Massachusetts.....	138,855.54	138,855.54	-
Michigan.....	466,891.99	466,891.99	-
Minnesota.....	487,577.82	487,577.82	-
Mississippi.....	687,052.30	687,052.30	-
Missouri.....	606,111.47	606,111.47	-
Montana.....	174,597.64	174,597.64	-
Nebraska.....	347,358.63	347,358.63	-
Nevada.....	73,178.64	73,178.64	-
New Hampshire.....	96,440.82	96,440.82	-
New Jersey.....	172,749.45	172,749.45	-
New Mexico.....	142,485.31	142,485.31	-
New York.....	490,947.68	490,947.68	-
North Carolina.....	831,314.56	831,314.56	-
North Dakota.....	249,209.65	249,209.65	-
Ohio.....	599,205.91	599,205.91	-
Oklahoma.....	555,202.22	555,202.22	-
Oregon.....	186,958.47	186,958.47	-
Pennsylvania.....	624,374.05	624,374.05	-
Rhode Island.....	60,380.95	60,380.95	-
South Carolina.....	500,424.02	500,424.02	-
South Dakota.....	263,509.04	263,509.04	-
Tennessee.....	636,193.99	636,193.99	-
Texas.....	1,192,057.41	1,192,057.41	-
Utah.....	122,117.04	122,117.04	-
Vermont.....	114,367.63	114,367.63	-
Virginia.....	535,718.69	535,718.69	-
Washington.....	220,243.49	220,243.49	-
West Virginia.....	321,045.82	321,045.82	-
Wisconsin.....	490,785.21	490,785.21	-
Wyoming.....	109,875.74	109,875.74	-
Alaska.....	21,418.00	23,918.00	+\$ 2,500
Hawaii.....	128,251.42	128,251.42	-
Puerto Rico.....	161,689.00	224,689.00	+ 63,000
Total.....	18,584,642.67	18,650,142.67	+ 65,500

Table 4. Total allotments to States and Territories from Federal (including U.S.D.A.) and State sources for extension work, fiscal year 1940.

State	Total	Total Federal funds	Total within the States
Alabama.....	\$936,395.02	\$700,282.82	\$236,112.20
Arizona.....	135,195.21	117,005.21	68,190.00
Arkansas.....	902,402.37	580,410.37	321,992.00
California.....	980,644.09	406,587.96	574,056.13
Colorado.....	371,376.52	214,938.52	156,438.00
Connecticut.....	270,228.02	131,490.02	138,738.00
Delaware.....	94,473.09	76,598.09	17,875.00
Florida.....	454,858.61	223,033.77	231,824.84
Georgia.....	1,073,705.71	736,318.71	337,387.00
Idaho.....	281,603.59	156,847.74	124,755.85
Illinois.....	1,107,889.31	581,835.90	526,053.41
Indiana.....	961,028.16	467,592.67	493,435.49
Iowa.....	1,209,474.81	533,134.33	676,340.48
Kansas.....	919,588.13	403,995.92	515,592.21
Kentucky.....	919,526.60	630,340.60	289,186.00
Louisiana.....	750,991.85	460,996.85	289,995.00
Maine.....	238,262.51	157,686.44	80,576.07
Maryland.....	366,259.34	196,957.15	169,302.19
Massachusetts.....	491,473.04	138,855.54	352,617.50
Michigan.....	821,658.99	466,891.99	354,767.00
Minnesota.....	803,502.82	487,577.82	315,925.00
Mississippi.....	1,038,996.30	687,052.30	351,944.00
Missouri.....	889,995.39	606,111.47	283,883.92
Montana.....	351,820.64	174,597.64	177,223.00
Nebraska.....	633,400.63	347,358.63	286,042.00
Nevada.....	136,813.66	73,178.64	63,635.02
New Hampshire.....	232,358.82	96,440.82	136,418.00
New Jersey.....	455,721.21	172,749.45	282,971.76
New Mexico.....	276,678.31	142,485.31	134,193.00
New York.....	1,755,416.73	490,947.68	1,264,469.05
North Carolina.....	1,212,779.96	831,314.56	381,465.40
North Dakota.....	394,748.18	249,209.65	145,538.53
Ohio.....	1,041,046.91	599,205.91	441,841.00
Oklahoma.....	870,639.22	555,202.22	315,437.00
Oregon.....	510,703.02	186,958.47	323,744.55
Pennsylvania.....	1,026,351.05	624,374.05	401,977.00
Rhode Island.....	81,820.19	60,380.95	21,439.24
South Carolina.....	694,640.02	500,424.02	194,216.00
South Dakota.....	325,141.30	263,509.04	61,632.26
Tennessee.....	928,423.87	636,193.99	292,229.88
Texas.....	2,021,170.49	1,192,057.41	829,113.08
Utah.....	204,283.04	122,117.04	82,166.00
Vermont.....	216,767.63	114,367.63	102,400.00
Virginia.....	921,190.71	535,718.69	385,472.02
Washington.....	410,750.96	220,243.49	190,507.47
West Virginia.....	508,587.32	321,045.82	187,541.50
Wisconsin.....	785,317.00	490,785.21	294,531.79
Wyoming.....	199,135.00	109,875.74	89,259.26
Alaska.....	29,918.00	21,418.00	8,500.00
Hawaii.....	163,802.30	128,251.42	35,550.88
Puerto Rico.....	315,640.13	161,689.00	153,951.13
Total.....	32,775,095.78	18,584,642.67	14,190,453.11

As the major purpose of these payments to States is for the employment of extension workers in counties and colleges, the following comparative statement is submitted showing agents employed:

Table 5. Extension field agents employed June 30, 1936, 1937, 1938, and 1939.

	June 30, 1936	June 30, 1937	June 30, 1938	June 30, 1939
State Supervisors	621	632	624	625
Subject-Matter Specialists:				
Full-time specialists	1,087	1,152	1,198	1,205
Part-time specialists	341	307	353	365
Special A.A.A. State workers ..	18	8	--	--
Total specialists	1,446	1,467	1,551	1,570
Total with headquarters at colleges	2,067	2,099	2,175	2,195
County Workers:				
Agricultural agents	3,701	3,809	3,825	3,911
Home demonstration agents	1,688	1,845	1,894	1,960
Boys' and girls' club agents ..	315	360	337	341
Negro extension agents	396	416	451	468
Special A.A.A. county workers ..	623	621	595	--
Total county workers	6,723	7,051	7,102	6,680
Total	8,790	9,150	9,277	8,875

Number of counties in the States, Hawaii, and Puerto Rico	3,154
Approximate number of counties now having one or more agents	2,990

A discussion of the activities under the various appropriation items follows.

(a) CAPPER-KETCHAM EXTENSION WORK

Appropriation Act, 1940.	\$1,480,000
Budget Estimate, 1941.	<u>1,480,000</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)
Payments to States and Hawaii for further development of cooperative agricultural extension work (Capper-Ketcham extension work).	\$1,480,000	\$1,480,000	\$1,480,000

WORK UNDER THIS APPROPRIATION

This appropriation, which is specifically authorized by the Capper-Ketcham Act of May 22, 1928 (7 U.S.C. 343a, 343b), provides for the further development of agricultural extension work and supplements the permanent annual appropriation provided under the Smith-Lever Act of May 8, 1914, (7 U.S.C. 341-348). The Capper-Ketcham Act authorizes an appropriation of \$980,000 to be divided at the rate of \$20,000 to each State and to Hawaii, without requirement for State and Territorial offset, and an additional \$500,000 to be divided among the States and Hawaii on the basis of rural population, the allotments from this additional \$500,000 to be met dollar for dollar by the States or Territory before the money becomes available. The Act further provides that at least 80 percent of the funds appropriated under this authorization shall be expended for salaries of county extension agents and that the extension agents appointed under its provisions shall be men and women in fair and just proportions.

The work carried on under this project is a part of the general extension program conducted with funds from appropriation items "Permanent Specific Appropriation" (Smith-Lever Act), "Extension work, Act of April 24, 1939", "Extension work, section 21, Bankhead-Jones Act", "Alaska", and "Puerto Rico". As these funds are merged with all other funds allotted to States, the particular work under this project cannot be separated. For the combined statement, see statement of work under the project for the basic act "Permanent Specific Appropriation" (Smith-Lever Act), which inaugurated the national system of cooperative extension work in agriculture and home economics in connection with the land-grant colleges.

The State allotments are paid directly to a designated officer in each State and are disbursed by the States in accordance with budgets and programs of work submitted by the State directors of extension and approved by the Secretary of Agriculture. Expenditures by the States from this and other cooperative extension appropriations are subject to annual examination by representatives of the Department.

(b) EXTENSION WORK, ACT OF APRIL 24, 1939.

Appropriation Act, 1940 \$203,000
 Budget Estimate, 1941 203,000

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)
Payments to States for further development of cooperative agricultural extension work (Extension work, Act of April 24, 1939)	--	\$203,000	\$203,000

WORK UNDER THIS APPROPRIATION

The Act of April 24, 1939 (Public 41, 76th Congress), authorized an annual appropriation of \$300,000 for distribution to the States for the further development of cooperative agricultural extension work.

This authorization contemplated provision for payments to 21 States to prevent decreases in their total allotments of Federal funds for cooperative extension work and some increase for payments to States in which reclamation projects are conducted for the purpose of increasing extension work with settlers on Federal reclamation projects. As to the first purpose, such decreases would otherwise have occurred because of the elimination from the appropriation for 1940 of two items carried in the 1939 Appropriation Act, known as the Supplementary Cooperative Extension Work item, in the amount of \$395,000, and the Additional Cooperative Extension Work item in the amount of \$275,000. The sum of \$203,000, appropriated for the fiscal year 1940, was apportioned among 21 States to prevent decreases in their total allotments of Federal funds for cooperative extension work, as shown by the table which follows. No appropriation was made for the second purpose.

Apportionment of \$203,000 appropriated

Arizona	\$6,952	New Hampshire	\$4,150
Colorado	15,430	New Jersey	13,946
Connecticut	8,036	New Mexico	8,330
Florida	8,462	North Dakota	6,416
Idaho	9,450	Oregon	16,782
Maine	3,840	South Dakota	21,406
Maryland	3,740	Utah	8,735
Massachusetts	7,130	Vermont	1,520
Montana	19,670	Washington	905
Nebraska	6,681	Wyoming	18,995
Nevada	12,424	Total allotments ..	<u>203,000</u>

The work carried on under this project is a part of the general extension program conducted with funds from appropriation items, "Permanent Specific Appropriation" (Smith-Lever Act), "Capper-Ketcham Extension Work," "Extension work, section 21, Bankhead-Jones Act", "Alaska", and "Puerto Rico". As these funds are merged with all other funds allotted to States, the particular work under this project cannot be separated. The State allotments are paid directly to a designated officer in each State and are disbursed by the States in accordance with budgets and programs of work submitted by the State directors of extension and approved by the Secretary of Agriculture. Expenditures by the States from this and other cooperative extension appropriations are subject to annual examination by representatives of the Department.

(c) EXTENSION WORK, SECTION 21, BANKHEAD-JONES ACT

Appropriation Act, 1940 \$12,000,000
 Budget Estimate, 1941 12,000,000

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)
Payments to States and Hawaii for cooperative agricultural extension work (Extension work, section 21, Bankhead-Jones Act).....	\$11,000,000	\$12,000,000	\$12,000,000

WORK UNDER THIS APPROPRIATION

This appropriation provides for the further development of cooperative extension work and is specifically authorized by the provisions of section 21, title II, of the Bankhead-Jones Act of June 29, 1935 (7 U. S. C. 343c), and augments the cooperative agricultural extension funds provided by the Smith-Lever Act of 1914, and the Capper-Ketcham Act of May 22, 1928. While no State offset is required for the funds under this Act, these funds are available to the States only after they have met the required State offset to funds provided under the permanent Smith-Lever Act and the Capper-Ketcham Act. Under section 21 of the Bankhead-Jones Act, \$20,000 is allotted to each State and to Hawaii. The remainder of the funds is then allotted to each State and Hawaii on the basis of farm population.

The work carried on under this project is a part of the general extension program conducted with funds from appropriation items, "Permanent Specific Appropriation" (Smith-Lever Act), "Capper-Ketcham Extension Work", "Extension work, Act of April 24, 1939", "Alaska", and "Puerto Rico". As this fund is merged with all other funds allotted to the States, the particular work under this project cannot be separated. For the combined statement, see work under the project for the basic act, "Permanent Specific Appropriation" (Smith-Lever Act), which inaugurated the national system of cooperative extension work in agriculture and home economics in connection with the Land-Grant Colleges.

The State allotments are paid directly to a designated officer in each State and are disbursed by the States in accordance with budgets and programs of work submitted by the State directors of extension and approved by the Secretary of Agriculture. Expenditures by the States from this and other cooperative extension appropriations are subject to annual examination by representatives of the Department.

(d) ALASKA

Appropriation Act, 1940	\$21,418
Budget Estimate, 1941	23,918
Increase	<u>2,500</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. Extension of the Smith-Lever Act to Alaska (Act of Feb. 23, 1929)	\$13,918	\$13,918	\$13,918	--
2. Extension of the Capper-Ketcham Act to Alaska (Act of June 20, 1936) ..	7,500	7,500	10,000	+ \$2,500(1)
Total appropriation ..	21,418	21,418	23,918	+ 2,500(1)

INCREASE

(1) The increase of \$2,500 in this item for 1941 represents the final annual increment authorized for extension work in Alaska under the Act of June 20, 1936 (7 U. S. C. 343e), extending the Capper-Ketcham Act to Alaska. The amount requested, \$10,000, is the maximum amount authorized for cooperative agricultural extension work under the Act of June 20, 1936, extending the benefits of the Capper-Ketcham Act to Alaska. The present appropriation, \$7,500, has made possible a greatly needed expansion of the small force at work in the Territory. The increase of \$2,500 authorized for 1940 but not appropriated is requested for fiscal year 1941 to provide for additional traveling expenses and clerical assistance. The four field workers are obliged to travel great distances to reach and instruct the people and to give them practical demonstrations in improved farming and homemaking for the purpose of stimulating individual initiative, the betterment of agricultural conditions in the Territory and improvement of living conditions of farm families. Additional funds for travel would enable them to meet more adequately the demands for assistance. The technical staff is urgently in need of more clerical help.

WORK UNDER THIS APPROPRIATION

General. -- Extension work in agriculture and home economics in Alaska is of a similar nature to that conducted in the States, modifications being made to suit local conditions. In agriculture it includes gardening, some dairying, fur production, and marketing. In home economics there is a wide field for home improvement, due to somewhat pioneer conditions of many Alaskan homes. The 4-H Club work with boys and girls is stressed along the lines of both agriculture and home economics. These Federal funds are paid directly to a designated officer in the Territory and are disbursed in accordance with budgets and programs of work submitted by the director of extension and approved by the Secretary of Agriculture. Expenditures are subject to examination by representatives of the Department. The provisions of the Smith-Lever Act of 1914 and the Capper-Ketcham Act of 1928 were extended to Alaska by special acts of Congress to provide for cooperative agricultural extension work in the Territory, as follows:

1. Extension of the Smith-Lever Act to Alaska (Act of Feb. 23, 1929). -- The extension of the Smith-Lever Act to Alaska is specifically authorized by the act approved February 23, 1929 (7 U. S. C. 386c). Under the provisions of this act, \$10,000 is appropriated annually to Alaska without requirement of Territorial offset, and the remainder, \$3,918 must be matched by Territorial funds used for extension work. Experiment stations have been maintained in Alaska for many years but cooperative agricultural extension work was not systematically begun among farmers until 1931.

2. Extension of the Capper-Ketcham Act to Alaska (Act of June 20, 1936). -- Funds provided under the Act of February 23, 1929 were supplemented by the extension of the Capper-Ketcham Act to Alaska as specifically authorized by an Act approved June 20, 1936 (7 U. S. C. 343e). Under the provisions of this act, \$2,500 was authorized for the fiscal year 1937, to be increased on recommendation of the Secretary of Agriculture by this amount annually until a total of \$10,000 is reached. No appropriation was made for the fiscal year 1937 but \$5,000 was appropriated under this act for the fiscal year 1938 and \$7,500 for each of the fiscal years 1939 and 1940. The act also provides that the several established judicial divisions of the Territory of Alaska, as the same shall exist from time to time, shall be considered as counties for the purpose of complying with the provisions of the act until a sub-division of the Territory into counties is effected. No Territorial offset is required for any of the funds under the Act approved June 20, 1936.

(e) PUERTO RICO

Appropriation Act, 1940.	\$65,000
Budget Estimate, 1941.	128,000
Increase	<u>63,000</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
Payments to Puerto Rico for extension of sec- tion 21, Bankhead-Jones Act to Puerto Rico (Puerto Rico)	\$45,000	\$65,000	\$128,000	+\$63,000(1)

INCREASE

(1) The increase of \$63,000 in this item for 1941 is to carry out the provisions of the Act of August 28, 1937 (7 U. S. C. 343f, 343g), extending the benefits of section 21 of the Bankhead-Jones Act to Puerto Rico.

An urgent need exists for additional county agents and home demonstration agents for extension work in agriculture and home economics in Puerto Rico. Therefore, additional funds are requested in the amount of \$63,000, as authorized under the Puerto Rico Act approved August 28, 1937, extending the benefits of section 21 of the Bankhead-Jones Act of 1935 to Puerto Rico. The total amount authorized for Puerto Rico for 1941 is \$168,000 (\$88,000 for fiscal year 1939, with annual increments of \$40,000 for fiscal years 1940 and 1941 respectively).

Section 21 of the Bankhead-Jones Act of 1935 provides for distribution of funds to the States and Hawaii on the basis of farm population. If the act had been applicable to Puerto Rico when originally enacted, Puerto Rico would have received an allotment of approximately \$408,000 in the fiscal year 1940, instead of in the fiscal year 1947 as authorized under the act extending the benefits of section 21 of the Bankhead-Jones Act of 1935 to Puerto Rico. However, in extending the benefits of the Bankhead-Jones Act of 1935 to Puerto Rico allowance was made for the fact that there was a lack of trained personnel for employment there, and Congress fixed the allotments at amounts which could be effectively utilized. Since only \$65,000 of the \$128,000 authorized was actually appropriated for the fiscal year 1940, Puerto Rico has failed to receive the full benefits of the original plan for the betterment of agricultural conditions on the Island.

For 1940 there is available to Puerto Rico \$95,069 under the permanent Smith-Lever Act, \$65,000 from this Puerto Rico Act, and \$1,620 from the farm forestry fund, and this, in conjunction with \$152,000 provided by sources in Puerto Rico, is sufficient to employ a technical force of only 84 extension workers, to reach a farm population of approximately 1,200,000. The additional funds requested would enable Puerto Rico to increase the staff by 27 extension workers. Personnel has been trained by the University of Puerto Rico to fill such positions.

WORK UNDER THIS APPROPRIATION

The Act approved August 28, 1937 (7 U. S. C. 343f, 343g), authorizes the extension of section 21 of the Bankhead-Jones Act of 1935 to Puerto Rico, with the provision that the amounts to be paid to Puerto Rico are authorized without diminution of the amounts authorized for payment to the States and the Territory of Hawaii in section 21 of the original act. This act also authorizes the payment of \$88,000 to Puerto Rico for the first fiscal year following enactment, with annual increments of \$40,000 thereafter until the total reaches \$408,000, continuing thereafter in that amount. The amount appropriated for Puerto Rico for fiscal year 1939 was \$45,000 instead of \$88,000 as authorized, for 1940, \$65,000 instead of \$128,000 as authorized. This fund augments the cooperative agricultural extension funds provided for Puerto Rico, (\$95,069) under the permanent Smith-Lever Act approved May 8, 1914 (7 U.S.C. 341-348), which act was amended by the Act of March 4, 1931 (7 U. S. C. 386d-386f), to extend its benefits to Puerto Rico. The funds are available to Puerto Rico only after it has met the required offset to funds provided under the permanent Smith-Lever Act.

Extension work in agriculture and home economics in Puerto Rico is of similar nature to that conducted in the States, modifications being made to suit local conditions. The extension agents of Puerto Rico are responsible for bringing to all rural people of the Island the latest information regarding agriculture and home economics and for helping them adopt improved methods and practices in the production and marketing of crops and livestock; the growing of gardens and other home food supplies; the preservation of food; adequate diets for health; improved sanitation; the development of community life; and other activities to promote higher standards of living. The 4-H Club work with boys and girls is stressed along the lines of both agriculture and home economics. The large farm population of Puerto Rico is suffering from unsatisfactory economic and living conditions in the Island and extension agents are obliged to make a great many visits to individual farms to reach and instruct these people and to give them practical demonstrations in improved farming and homemaking for the purpose of stimulating individual initiative, the betterment of agricultural conditions in the Island, and improvement of living conditions of farm families. Special attention is being given to the production of home food supplies and to the development of home industries to supplement the meager income of rural families.

The Territorial allotments are paid directly to a designated officer and are disbursed in accordance with budgets and programs of work submitted by the director of extension of Puerto Rico and approved by the Secretary of Agriculture. Expenditures by Puerto Rico from this and other cooperative extension appropriations are subject to examination by representatives of the Department.

(f) ADDITIONAL COOPERATIVE EXTENSION WORK

There was no appropriation made for the item "Additional Cooperative Extension Work" in the budget for the fiscal year 1940, and no estimate is submitted for 1941. The appropriation for the fiscal year 1939, \$275,000, provided funds for direct payments to State colleges of agriculture as Federal aid for the promotion of extension work in agriculture and home economics.

(g) SUPPLEMENTARY COOPERATIVE EXTENSION WORK

There was no appropriation made for the item "Supplementary Cooperative Extension Work" in the budget for the fiscal year 1940, and no estimate is submitted for 1941. The appropriation for the fiscal year 1939, \$395,000, provided funds for direct payments to State colleges of agriculture as Federal aid for the promotion of extension work in agriculture and home economics.

Direct Appropriations to the Department

(h) GENERAL ADMINISTRATIVE EXPENSES

This item is carried in the 1940 Appropriation Act (\$126,246), and for 1941 is consolidated in the estimates under "Administration and coordination of extension work".

(i) FARMERS' COOPERATIVE DEMONSTRATION WORK

This item is carried in the 1940 Appropriation Act, (\$560,170) and for 1941 is consolidated in the estimates as follows: \$460,170 under "Administration and coordination of extension work", and \$100,000 under "Extension information".

(j) ADMINISTRATION AND COORDINATION OF EXTENSION WORK

Appropriation Act of 1940:

General Administrative Expenses...	\$126,246
Farmers' Cooperative Demon-	
stration Work.....	<u>460,170</u>
Total available, 1940.....	<u>586,416</u>
Budget Estimate, 1941.....	<u>554,016</u>
Decrease.....	<u><u>32,400</u></u>

CHANGES IN LANGUAGE

New language is proposed in substitution for language now carried under items in the Agricultural Appropriation Act for Salaries and Expenses, Extension Service. The proposed appropriation item, "Administration and coordination of extension work" merges the funds of the General Administrative Expenses item, and all of the Farmers' Cooperative Demonstration Work item, with the exception of those now used for information work.

This proposed item is to provide for administrative functions in relation to the work in Washington and the field. The new language is not intended to change the general administrative functions but to more clearly and more accurately define the responsibility for the administration of grants to States and Territories, the coordination of Departmental and State extension work, and the general supervision over county agent, home demonstration, 4-H Club, and other lines of extension work.

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase or decreases
1. General administration and business service..	\$122,959	\$126,246	\$125,000	-\$1,246 (1)
2. Review and analysis of State budgets, projects, and plans, and examination of State expenditures from Federal payments.....	70,261	70,670	70,000	-670 (1)
3. Planning and coordination of State and county extension work	203,461	214,500	195,000	-19,500 (1)
4. Development of technical subject matter for use by State extension forces.....	157,991	175,000	160,000	-15,000 (1)
5. Additional for administrative promotions.	-	-	4,016	+ 4,016 (2)
Unobligated balance.....	16,744	-	-	-
Total appropriation..	571,416	586,416	554,016	-32,400

INCREASES OR DECREASES

The decrease of \$32,400 in this item for 1941 consists of two items, as follows:

(1) A reduction of \$36,416 under this item, allocated as shown in the project statement, represents reductions in expenditures for salaries, travel, and miscellaneous expenses.

(2) \$4,016 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--It is proposed to provide for the continuation of administrative functions relating to the work in Washington and the field by combining into one item all the functions of the "General administrative expenses" item and all of the "Farmers' cooperative demonstration work" item, with the exception of the work now relating to extension information which is incorporated under a proposed new item entitled, "Extension information". Included with these estimates is a specific recommendation for an item on this proposed basis entitled, "Administration and coordination of extension work", together with new language which is not intended to change the general administrative functions but is intended to define more clearly and more accurately the responsibility for the administration of grants to States and Territories and the coordination of Departmental and

State extension work. This item, "Administration and coordination of extension work", provides funds for the Extension Service of the United States Department of Agriculture to administer the various Congressional Acts and for general supervision of cooperative extension work in agriculture and home economics conducted in continental United States and the Territories of Alaska, Hawaii, and Puerto Rico, the furnishing of technical advice and assistance to State and Territorial Extension Services and the maintenance of the necessary professional and clerical staff in the District of Columbia.

1. General Administration and Business Service.-- This project covers the work of the Offices of the Director and Assistant Director of Extension Work, and the Division of Business Administration. The Office of the Director has general supervision over the entire Extension Service in both Washington and the field and through the Division of Business Administration supervises personnel, fiscal, budgetary, purchase, and similar activities. Continuance of this project is essential to the proper administration of the Extension Service.

2. Review and Analysis of State Budgets, Projects, and Plans, and Examination of State Expenditures from Federal Payments. Under this project a staff of technical and clerical assistants are maintained to review the budgets, projects, and plans of work submitted by State extension services, as a basis for allotment of funds provided under the Smith-Lever Act and acts amendatory or supplementary thereto, as well as required State offset. This staff is responsible also for making the annual examination of expenditures of Federal funds and offset thereto in the various States and Territories to determine whether the expenditures have been made in accordance with approved projects and plans of work and in compliance with the governing extension laws and regulations. The conditions surrounding the use of such funds and results attained are reported to the Director of Extension work and studies and recommendations are made for revision of basic plans and better distribution of funds by projects. This project is essential to the proper examination of expenditures and administration under acts authorizing payments to States.

3. Planning and Coordination of State and County Extension Work.-- The object of this project is to supervise, coordinate, and study work conducted by State extension services under projects and plans approved by the Director of Extension Work for the purpose of developing and carrying into effect extension programs best fitted to the needs of rural people. Technically trained leaders with experience in State and Federal extension work supervise and coordinate activities of county agricultural and home demonstration agents, boys' and girls' 4-H Club work, and other phases of cooperative extension work in the various States and Territories. They assist also with the coordination of extension work with the Department's National programs for agriculture, the direction and supervision of studies of effective means for conducting extension work and the development of personnel training courses. The work is accomplished (1) by means of visits to States and county offices, where, through conferences, farm and home visits, and field studies, the procedures, problems, and progress of directors, supervisors, and extension agents are considered,

improvements suggested, and agreements reached with respect to the further effective development of the work, and (2) by means of correspondence, studies of material, data, reports, plans from the States and counties, frequent conferences with staff members, and the preparation of technical material for State, county, and Department agricultural workers.

4. Development of Technical Subject Matter for Use by State Extension Forces. -- The object of this project is to provide State extension forces with the results of the research work of the Department and assist in correlating such information with State extension programs in order that agriculture and home economic practices may be improved and net farm incomes increased. A technical staff specializing in the various phases of agriculture, home economics, and agricultural economics, acts as liaison between the various bureaus and agencies of the Department and the Extension Service. They are responsible for providing the essential technical material which may be ready for extension, resulting from the Department's research findings, and for so organizing the material that it may be used effectively in the programs in the field. The extension subject-matter specialists office with and are responsible to the respective bureaus of the Department for the accuracy of the subject matter which they carry to the States. In their contacts with the extension field forces and for administrative direction, they are responsible to the Extension Service. A staff of economists gives full time to the extension of agriculture and home economics along the lines of marketing, farm management, farm credit, and like matters. These agricultural extension specialists and economists collaborate with State specialists in the development of sound programs to improve agriculture and home economic practices, and increase farm incomes. They likewise study the way agricultural extension work is organized and conducted in each State, as well as the results obtained, and carry the best practices found in each State to all the States.

SUPPLEMENTAL FUNDS

Projects	Obligated 1939	Estimated Obligations 1940	Estimated Obligations 1941
<u>Agricultural Adjustment Administration (Salaries and Expenses):</u>			
For technical assistance on marketing agreement programs...	\$8,000	\$10,000	\$10,000
<u>Conservation and Use of Agricultural Land Resources:</u>			
For special assistance to display agricultural conservation exhibits.....	3,500	4,200	4,200
For special assistance to State extension forces on agricultural conservation program planning....	62,500	-	-
Total.....	66,000	4,200	4,200
Total, Supplemental Funds...	74,000	14,200	14,200

(k) MOTION PICTURES

This item is carried in the 1940 Appropriation Act (\$79,000), and \$450 of this amount was transferred to "Salaries, Office of the Secretary of the Interior", pursuant to the provisions of the Reorganization Act of 1939 and Reorganization Plan No. II, and the remaining \$78,550 for 1941 is consolidated in the estimates under "Extension information".

(1) AGRICULTURAL EXHIBITS AT FAIRS

This item is carried in the 1940 Appropriation Act (\$85,000) and for 1941 is consolidated in the estimates under "Extension information".

(m) EXTENSION INFORMATION

Appropriation Act, 1940:

Farmers' Cooperative Demonstration Work.....	\$100,000
Motion Pictures.....	\$79,000
Transferred to "Sal-	
aries, Office of the	
Secretary of the	
Interior" pursuant to	
Reorganization Plan No. II	-450
	78,550
Agricultural Exhibits at Fairs.....	85,000
Total available, 1940.....	263,550
Budget Estimate, 1941.....	252,540
Decrease.....	11,010

CHANGES IN LANGUAGE

New language is proposed in substitution for language now carried under items in the Agricultural Appropriation Act for Salaries and Expenses, Extension Service. The proposed appropriation item, "Extension information", merges the funds for information work now provided under the Farmers' Cooperative Demonstration Work item and the items for Motion Pictures and Agricultural Exhibits at Fairs, in order to combine into one item the work relating to extension information.

This proposed item is to provide for the continuation of necessary work relating to extension information. The language recommended will provide also for closer coordination of the various types of extension information and permit a broader cooperative program for its more effective distribution.

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase or decreases
1. Preparation and distribution of visual material and extension literature to Department and State extension forces,.....	\$99,740	\$100,000	\$95,000	-\$5,000 (1)
2. Preparation and distribution of motion pictures on agriculture and related subjects.....	76,327	78,550	74,000	-4,550 (1)
3. Preparation and exhibition of agricultural exhibits.....	84,965	85,000	81,000	-4,000 (1)
4. Additional for administrative promotions	-	-	2,540	+2,540 (2)
Transferred for research work in photography to "Miscellaneous researches, transferred funds, National Bureau of Standards"	200	-	-	-
Transferred to "Salaries, Office of the Secretary of the Interior".....	450	-	-	-
Unobligated balance.....	2,318	-	-	-
Total appropriation..	264,000	263,550	252,540	-11,010

INCREASES OR DECREASES

The decrease of \$11,010 in this item for 1941 consists of two items, as follows:

(1) A reduction of \$13,550 under this item, allocated as shown in the project statement, represents reductions in expenditures for travel and miscellaneous expenses.

(2) \$2,540 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General: -- It is proposed to provide for the continuation of necessary work relating to extension information by combining into one item the activities heretofore conducted under separate appropriation items for Motion Pictures and Agricultural Exhibits at Fairs, together with that part of the Farmers' Cooperative Demonstration Work item heretofore utilized for the preparation and distribution of visual material and extension literature. Included with these estimates is a specific recommendation for an item on this proposed basis entitled, "Extension Information", together with new language which will provide for visual education through Extension Service channels and for cooperation with land grant colleges, State, county, and municipal agencies, and other organizations, and for cooperation with Bureaus of this Department and other Federal Departments and agencies. The language recommended will provide also for closer coordination of the various types of extension information and permit a broader cooperative program for its more effective distribution.

1. Preparation and Distribution of Visual Material and Extension Literature to Department and State Extension Forces. -- Under this project the Extension Service maintains such activities as its photographic library, editorial unit, preparation of radio programs, writers for the preparation of special educational material, lantern slides and film strips, and similar informational functions. Service in connection with information and illustrative material is rendered to the approximately 8,500 extension field workers. All annual reports and similar data are prepared under this project. This work is conducted in cooperation with the bureaus of this Department and other Federal departments and agencies which furnish authoritative subject matter.

2. Preparation and Distribution of Motion Pictures on Agriculture and Related Subjects. -- This project covers the motion picture work of the Extension Service, and in cooperation with the various Bureaus of the Department, State extension services, and other agencies, prepares and distributes motion pictures, to the approximately 8,500 extension workers and to educational agencies on request. Trained personnel is provided for making the necessary pictures, and for recording sound, development, processing, and other steps essential to the preparation of films. Necessary traveling expenses and funds for the transportation of equipment are also provided. Records are maintained and films are booked, shipped, and inspected. Notifications of release of films are prepared and catalogs and other necessary information furnished.

3. Preparation and Exhibition of Agricultural Exhibits. -- This project covers the agricultural exhibits work of the Extension Service and, in cooperation with the various Bureaus of the Department, State extension services, and other agencies, prepares educational agricultural exhibits based on information developed in or sponsored by the Department and manages the display of exhibits at fairs,

expositions, meetings, conventions, etc. This includes the analysis of subject matter; preparation of exhibit designs and construction plans; construction and maintenance of exhibits; and negotiation of cooperative agreements with fairs, expositions, and other exhibition occasions. The handling and shipping of exhibits, and the management of displays at cooperating exhibition occasions are arranged and supervised. Assistance is furnished also to State and county extension services, insofar as possible, in the planning and building of exhibits, exhibition itineraries, exhibition management, and other advisory services.

(n) PAN AMERICAN EXPOSITION, TAMPA, FLORIDA

(Transfer to Agriculture, Act of May 23, 1938).

A transfer of \$448 was made to the Extension Service for the purpose of preparing an exhibit for display at the Pan American Exposition, Tampa, Florida, in the year 1939.

(o) SEVENTH WORLD'S POULTRY CONGRESS AND EXPOSITION

(Transfer to Agriculture, 1938 - Dec. 31, 1939, in accordance with provisions in the Acts of July 30, 1937 (50 Stat., p. 550), and Aug. 25, 1937 (50 Stat., p. 771), and with request contained in letter of the Secretary of Agriculture to the Secretary of State, dated December 23, 1937.)

The sum of \$27,075 was transferred to the Extension Service for participation in the Seventh World's Poultry Congress and Exposition held in 1939 in Cleveland, Ohio. Of this amount \$500 was obligated during the fiscal year 1938 and \$12,571 during 1939, and it is estimated that the remainder, \$14,004, will be obligated during the fiscal year 1940.

(p) COOPERATIVE FARM FORESTRY EXTENSION WORK

Appropriation Act, 1940	\$77,898
Budget Estimate, 1941	<u>78,098</u>
Increase	<u><u>200</u></u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. Technical advice and assistance in farm forestry to State extension forces ...	\$6,359	\$6,298	\$6,298	-
2. Allotments to States for cooperative farm forestry (Clarke-McNary Act)	50,034	71,600	71,600	-
3. Additional amount of administrative promotions	-	-	200	+200(1)
Unobligated balance	445	-	-	-
Total appropriation	56,838	77,898	78,098	+200

INCREASE

(1) The increase of \$200 in this item for 1941 represents the additional amount estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General. -- Section 5 of the Clarke-McNary Act of June 7, 1924, authorizes an annual appropriation of \$100,000 for the promotion of educational work with farm people in establishing, improving, and renewing woodlots, shelterbelts, windbreaks, and other valuable forest growth and in growing and renewing useful timber crops. Funds are allotted to the States and Territories in such amounts as the Secretary of Agriculture may determine upon or as may be agreed upon with the States, provided the States expend an equal amount for a like purpose. The present appropriation is \$77,898.

1. Technical Advice and Assistance in Farm Forestry to State Extension Forces. -- The object of this work project is to give technical advice and assistance in farm forestry to State extension forces. The allotment for the project covers the cost of the employment of one extension forestry specialist in Washington and travel in the States. His services are essential to the coordination of all extension activities in farm forestry in the field. He cooperates with the Federal Forest Service and is responsible to that Service for the information on all phases of forestry subject matter which he carries to the States, and to the Federal Extension Service for his contacts with extension forces in the field. The extension forester assists the State Extension Services to incorporate the practical

results of the research findings of the Federal Department in their State extension forestry programs and acts as a carrier of forestry extension information from State to State. This specialist also prepared forestry extension literature, makes talks, radio addresses and otherwise promotes better forestry practices.

2. Allotments to States for Cooperative Farm Forestry Under the Clarke-McNary Act. -- The funds for this project cover the cost of cooperation with the States in the employment of 46 extension farm foresters. A very large part of the farm acreage of the United States is in woodland, and much of the income of farmers in certain sections, particularly in the Northeastern and Southern States, is from forest products. County agents generally are not trained in forest management and need the assistance of farm forestry specialists in strengthening their work in this field. The extension forester arranges demonstrations in woodlot management, selection of trees for cutting, estimating of merchantable timber, and in other fields.

The allotments to the States and Puerto Rico under the Clarke-McNary Act for the fiscal year 1940 are as follows:

Alabama	\$3,240	Montana	\$800
Arkansas	1,620	Nebraska	1,620
California	1,620	New Hampshire	3,240
Colorado	1,620	New Jersey	1,620
Connecticut	1,620	New York	3,240
Florida	1,620	North Carolina	1,620
Georgia	1,620	North Dakota	1,260
Idaho	1,620	Ohio	1,620
Illinois	1,620	Pennsylvania	1,260
Indiana	1,620	South Carolina	1,620
Iowa	1,620	South Dakota	1,620
Kansas	1,020	Tennessee	1,620
Kentucky	1,620	Texas	1,620
Louisiana	1,620	Utah	1,080
Maine	1,620	Vermont	1,620
Maryland	1,620	Virginia	1,620
Massachusetts	1,620	Washington	1,620
Michigan	1,620	West Virginia	1,620
Minnesota	1,620	Wisconsin	3,240
Mississippi	1,620	Wyoming	1,260
Missouri	1,620	Puerto Rico	1,620

SUPPLEMENTAL FUND

Project	Estimated obligations 1940	Estimated obligations 1941
Cooperative Farm Forestry, Department of Agriculture (Extension Service):		
Cooperation with States for extension activities in developing farm forestry	\$50,000	\$50,000

(q) COOPERATIVE AGRICULTURAL EXTENSION WORK

(Permanent Annual Smith-Lever Appropriation)

Permanent Appropriation, 1940\$4,701,165
 Budget Estimate, 1941 4,701,165

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)
Payments to States, Hawaii, and Puerto Rico for cooperative agricultural extension work (Smith-Lever Act)	\$4,701,165	\$4,701,165	\$4,701,165

WORK UNDER THIS APPROPRIATION

This is the permanent specific appropriation for cooperative agricultural extension work provided in the Smith-Lever Act, approved May 8, 1914 (7 U. S. C. 341-348), as amended by the extension of this Act to the Territory of Hawaii by the Act of May 16, 1928 (7 U. S. C. 386-386b) and to Puerto Rico by the Act of March 4, 1931 (7 U. S. C. 386d-386f). Under the provisions of these acts, \$10,000 is appropriated annually to each State, Hawaii, and Puerto Rico without requirements of State or Territorial offset, and the remainder of the appropriation is distributed on the basis of rural population.

This is the basic act under which cooperative extension work is conducted by the Department and the State colleges of agriculture, making available to rural people information on agriculture and home economics. County agricultural agents, home demonstration agents, club workers, and State specialists assist adults and young people in the application of the results of research in agriculture and home economics to meet local conditions and to improve individual farm and home enterprises and rural life generally. Cooperative extension work is educational and, as stated in the Smith-Lever Act, consists of giving instruction and practical demonstrations in agriculture and home economics to persons not attending or resident in the State colleges. Extension work is based on local problems of rural people, and extension agents, with the aid of supervisors, extension specialists, Federal and State agencies, rural local leaders, and local agencies concerned, develop information with a view to improving existing agricultural and homemaking conditions. The development of this information takes into consideration such matters as character of the soil, land use, production yields, marketing trends, consumption demand, local farm and home practices, health and nutrition, family food supplies, housing and equipment, and human relations. In consultation with representatives from various agencies and with local committees, extension agents develop long-time goals and formulate current extension programs based on local problems. These programs are usually revised annually. The extension

workers undertake to carry out these programs in such a manner that the majority of rural families affected will apply new or improved methods, practices, and principles. Extension workers use a variety of direct and indirect teaching agencies and means, the greatest emphasis being placed on demonstrations carried on by the people on their own farms and in their own homes. Extension programs and teaching are carried on, in the last analysis, to aid in the development of the rural people themselves.

The State allotments are paid directly to a designated officer in each State and are disbursed by the States in accordance with budgets and programs of work submitted by the State directors of extension and approved by the Secretary of Agriculture. Expenditures by the States from this and other cooperative extension appropriations are subject to annual examination by representatives of the Department. It is estimated that during 1939 the States and counties contributed \$14,148,202 toward the support of extension work.

SUPPLEMENTAL FUNDS
(Complete bureau statement)

Projects	Obligated 1939	Estimated Obligations 1940	Estimated Obligations 1941
<u>Agricultural Adjustment Administration</u> <u>(Salaries and Expenses):</u>			
For technical assistance on marketing agreement programs.....	\$8,000	\$10,000	\$10,000
<u>Conservation and Use of Agricultural</u> <u>Land Resources:</u>			
For special assistance to display agricultural conservation exhibits.....	3,500	4,200	4,200
For special assistance to State extension forces on agricul- tural conservation program planning.....	62,500	-	-
Total.....	66,000	4,200	4,200
<u>Cooperative Farm Forestry, Department</u> <u>of Agriculture (Extension Service):</u>			
Cooperation with States for extension activities in devel- oping farm forestry.....	-	50,000	50,000
Total, Supplemental Funds.....	74,000	64,200	64,200

OFFICE OF FOREIGN AGRICULTURAL RELATIONS (*)

Appropriation Act, 1940	\$295,000
Transfer, pursuant to provisions of Reorganiza- tion Act of 1939 and Reorganization Plan No. II, to "Salaries and Expenses, Foreign Agricultural Service, Department of State"	98,604
Available, 1940	196,396
Budget Estimate, 1941	196,666
Increase	270

(*) See statement below under "Changes in language".

PROJECT STATEMENT

Project	1939	1940 (estimated)	1941 (estimated)	Increase
1. Foreign agricultural relations	\$195,646	\$196,396	\$196,396	- -
2. Additional for ad- ministrative pro- motions	- -	- -	270	+ \$270 (1)
Unobligated balance ...	750	- -	- -	- -
Total	196,396 (a)	196,396	196,666	270

(a) Exclusive of \$98,604 appropriated under this heading for 1939, transferred to State Department in 1940.

INCREASE

(1) \$270 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

CHANGES IN LANGUAGE

In order to recognize the change in this item effected under Reorganization Plan No. II and to conform to the present scope of the work, it is recommended in the estimates that the paragraph covering this appropriation be amended to read as follows:

[To enable] Salaries and expenses: For carrying out the functions of the Secretary of Agriculture to carry into effect the provisions of the Act entitled "An Act to promote the agriculture of the United States by expanding in the foreign field the service now rendered by the United States Department of Agriculture in acquiring and diffusing useful information regarding agriculture, and for other purposes approved] under the Act of June 5, 1930 (7 U.S.C. 541-545), [and for collecting and disseminating to American producers, importers, exporters, and other interested persons information relative to the world supply of and need for American agricultural products, marketing methods,

conditions, prices, and other factors, a knowledge of which is necessary to the advantageous disposition of such products in foreign countries, independently and in cooperation with other branches of the Government, State agencies, purchasing and consuming organizations, and persons engaged in the production, transportation, marketing, and distribution of farm and food [products,] products; to enable the Secretary of Agriculture to cooperate with American republics, as provided for by the Act approved August 9, 1939 (53 Stat. 1290) and including the employment of persons and means in the District of Columbia and elsewhere, and the purchase of such books and periodicals and not to exceed [\$1,000] \$500 for newspapers as may be necessary in connection with this work, [\$295,000] \$196,666.

With the transfer from the Department of Agriculture to the Department of State of the Foreign Agricultural Service and certain of its functions, pursuant to the provisions of the Reorganization Act of 1939 and Reorganization Plan No. II (House Document No. 288, 76th Congress) the Secretary established, by Memorandum No. 825, dated June 30, 1939, an "Office of Foreign Agricultural Relations" within the Department of Agriculture to take over the functions formerly performed by the Foreign Agricultural Service, but not transferred to the State Department, relating to the collection and dissemination of data on foreign agricultural production, foreign markets, foreign trade, and related matters obtained through the Foreign Service of the United States, the International Institute of Agriculture, commodity specialists of the Department of Agriculture, and other appropriate sources, specialized research on foreign demand for American agricultural products, etc. The foregoing language changes are suggested to cover the present scope of the work.

A clause has also been inserted authorizing the Secretary of Agriculture to utilize this item to make more effective the relationship between the American republics, as provided by the Act of August 9, 1939.

WORK UNDER THIS APPROPRIATION

The activities of the Office of Foreign Agricultural Relations embrace the collection, analysis, and dissemination of information relating to foreign agricultural production, trade, and government policies and the coordination and review of the Department's foreign relations. The Office also provides assistance and advice in connection with the action programs of the Department of Agriculture that are related to foreign trade.

The Office keeps in constant touch with the changing agricultural situation in the principal foreign countries through its own commodity specialists and the agricultural representatives of the Department of State and through cooperation with other Government agencies, the International Institute of Agriculture, and foreign governments.

Basic research and investigations are constantly carried on in respect to trends in foreign agricultural production, international trade in agricultural products, and foreign government policies relating to agriculture. Outstanding studies in this field during the past

year related to causes of the decline of United States cotton exports and to analyses of foreign markets for United States tobacco. Other studies were devoted to price control measures in foreign countries and to foreign government measures designed to aid wheat producers. Special attention was devoted to improving and enlarging the foreign trade work of the Office in line with the increase in public interest in that subject.

Inquiries for information regarding foreign trade statistics and interpretation of specific foreign competition or foreign market situations emanating from other bureaus and offices of the Department of Agriculture have steadily increased. This is due in part to greater interest in foreign trade matters both on the import and export side and partly to a growing appreciation of the availability of such information in the Office of Foreign Agricultural Relations. Whatever the cause, this increased interest in foreign trade matters is taxing the present facilities of the Office.

All the proposals given serious consideration in the Agricultural Adjustment Administration with respect to export subsidies under Section 32 or import quotas under Section 22 of the Agricultural Adjustment Act are reviewed in the Office of Foreign Agricultural Relations, and with respect to most of them a considerable amount of information is supplied by the Washington staff and commodity specialists as well as the agricultural representatives of the Department of State.

In view of the larger present and prospective supplies of agricultural products and the likelihood of substantial increases in exportable surpluses, there is little doubt that more and more pressure will be brought to bear for an expansion of the export subsidy program. Since it is the present policy to grant export subsidies only in exceptional cases, it will be of increasing importance that individual proposals be closely scrutinized from the standpoint of (1) their practical effectiveness in aiding individual commodity situations as against possible programs for diversion in the domestic market, and (2) their commercial policy implications. The present war with its accompanying disruption of international trade is bringing to the fore proposals for import quotas under Section 22. The Office of Foreign Agricultural Relations also provides from its professional staff representatives from the Department of Agriculture on the numerous interdepartmental committees engaged in the conduct of the reciprocal trade agreements program. These representatives, on the basis of careful analyses of pertinent statistics and other information on agricultural production, consumption, and trade, assist in the preparation of the schedules of the individual trade agreements. They also follow the actual operation of the trade agreements from the standpoint of their effect on agricultural exports and imports.

The functions described above are those carried over from the former Foreign Agricultural Service. As a result of Reorganization Plan No. II, the Office of Foreign Agricultural Relations has acquired responsibilities in two fields of activity not formerly emphasized. The first of these relates to the creation of a closer and more effective collabor-

ation and liaison between the entire Department of Agriculture and the Foreign Service of the Department of State, with a view to assuring that the needs of the Department of Agriculture are covered in reports from foreign service officers. Second, as a staff function the Office of Foreign Agricultural Relations has larger responsibilities with respect to the coordination and review of all lines of work within the Department of Agriculture which are concerned with foreign relations.

The present European war illustrates the flexibility which must be maintained in respect to the work of the Office of Foreign Agricultural Relations. Under existing war conditions it is impracticable to continue the usual commodity and market investigations and reporting, particularly in the war zone, but the staff of the Office of Foreign Agricultural Relations has been busily engaged in following the numerous laws and decrees issued by the belligerents as well as other governments, and analyzing the effects of these on American agriculture.

Finally, the Office releases the information obtained to the public through its weekly publication "Foreign Crops and Markets," which carries material primarily relating to current crop and market developments, and through a monthly publication "Foreign Agriculture," and certain special reports which contain the more detailed and analytical studies representing the results of research in the field and in Washington in respect to agricultural policies and general agricultural developments in foreign countries.

SUPPLEMENTAL FUNDS

Projects	Obligated, 1939	Estimated obligations, 1940	Estimated obligations, 1941
<u>Agricultural Adjustment Adminis-</u> <u>tration: Salaries and expenses,</u> <u>for services in connection with</u> <u>agricultural adjustment pro-</u> <u>grams</u>	\$24,674	\$25,000	\$25,000

WEATHER BUREAU

(a) SALARIES AND EXPENSES

Change in Language

The language of the introductory paragraph has been amended by the insertion of an additional clause "for promoting the safety and efficiency of aircraft, as provided by section 803 of the Civil Aeronautics Act of 1938, and for observing, measuring, and investigating atmospheric phenomena".

The amendment is recommended in order to more completely describe the purposes of the Act in connection with the merger of subappropriations under one title, the explanation of which is given under the head "Changes in Language" under the item "Observations, Warnings, and General Weather Service".

(b) GENERAL ADMINISTRATIVE EXPENSES

Appropriation Act, 1940	\$145,000
Budget Estimate, 1941	147,060
Increase	2,060

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. General administrative and business service.....	\$144,254	\$145,000	\$145,000	-----
2. Administrative Promotions.....	- -	- -	2,060	+ \$ 2,060 (1)
Unobligated balance.....	746	- -	- -	- - -
Total appropriation.....	145,000	145,000	147,060	+ 2,060

INCREASES

(1) The increase of \$2,060 in this item represents the additional amount estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

This appropriation provides for the maintenance of general administrative and fiscal units, including offices concerned with matters of accounting, contracts, files, personnel, and property.

(c) GENERAL WEATHER SERVICE AND RESEARCH

(d) AIRWAYS WEATHER SERVICE AND RESEARCH

In the estimates for 1941 these two appropriations, carried separately in the Agricultural Appropriation Act for 1940, are recommended to be merged with the designation "Observations, Warnings, and General Weather Service." The 1940 amounts are as follows:

General Weather Service and Research	\$2,527,870
Airways Weather Service and Research	3,500,000

(e) OBSERVATIONS, WARNINGS, AND GENERAL WEATHER SERVICE

Appropriation Act, 1940:

"General Weather Service and Research"	\$2,527,870
"Airways Weather Service and Research"	3,500,000
Total available, 1940	6,027,870
Budget Estimate, 1941	6,481,560
Increase	<u>453,690</u>

CHANGES IN LANGUAGE

In the estimates the language of the item "General Weather Service and Research" has been amended by (1) substituting therefor the title "Observations, Warnings, and General Weather Service"; (2) adding the word "aerological", in order to consolidate the items of "General Weather Service and Research" and "Airways Weather Service and Research" in a single item under a more descriptive title; and (3) eliminating the clause setting aside a specific amount for research on the relationship of weather conditions to forest fires.

The purpose of the consolidation is to meet an unsatisfactory situation which has been recognized for some time but has within the past couple of years become acute. The basic activities conducted by the Weather Bureau under "General weather service and research" and "Airways weather service and research" are so similar and so interwoven that it is difficult to certify accurately, with respect to many expenditures, which are properly chargeable to one or the other appropriation. Merger of the two appropriations would automatically eliminate questionable certifications and clarify the type of questions which have been raised informally by representatives of the General Accounting Office who have surveyed the accounting procedures of the Weather Bureau.

The broad, fundamental purpose of expenditures under the two appropriation items is identical, namely, the collection and dissemination of meteorological information. Observations from stations which are maintained under the "General weather service and research" appropriation are used extensively in the airway work. Likewise, upper-air data secured by means of airplanes, sounding balloons, and pilot balloons, conducted under "Airways weather service and research" and primarily for airway service,

are used for, and are of inestimable value in connection with, the general weather forecasts and warnings conducted under "General weather service and research". In fact, observations obtained by means of both of these sub-appropriations are used in the conduct and maintenance of all Weather Bureau activities.

Although consolidation of the two subappropriations will effect a more simplified audit and accounting of expenditures, it will not result in the loss of identity of any project of work since all the activities now being conducted by the Weather Bureau will continue, as at present, to be accounted for under the uniform project system of the Department. This system provides as accurate a determination of the costs of the several functional projects of the Bureau as can be obtained without a technical and very expensive cost accounting system.

The deletion of the clause "including \$3,930 for investigations of the relationship of weather conditions to forest fires, under section 6 of the Act approved May 22, 1928 (16 U. S. C. 581e)," is proposed in the estimates because the McNary-McSweeney Forest Research Act authorized specific amounts for this purpose for a period of 10 years ending with the fiscal year 1938, and authorized thereafter such amounts as Congress may determine.

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. General forecast and warning service.....	\$943,000	\$1,135,000	\$1,193,000	+\$58,000(1)
2. Climatological service.....	682,143	682,600	707,600	+ 25,000(2)
3. Hurricane and storm warning service.....	106,318	107,000	124,000	+ 17,000(3)
4. River and flood service.....	170,798	171,000	246,000	+ 75,000(4)
5. Forest fire-weather service.....	56,250	56,000	81,000	+ 25,000(5)
6. Agricultural meteorological service.....	120,623	120,000	120,000	---
7. Marine meteorological service.....	108,998	110,000	110,000	---
8. Horticultural protection service.....	39,916	42,000	42,000	---
9. Commercial airway meteorological service.....	1,958,326	2,747,000	2,847,000	+100,000(6)
10. Upper-air soundings.....	429,823	657,000	757,000	+100,000(7)
11. Meteorological physics.....	14,047	14,500	14,500	---
12. Forecast improvement investigations.....	29,134	29,800	29,800	---
13. Hurricane investigations....	3,608	3,800	3,800	---
14. River and flood investigations.....	20,862	21,000	21,000	---

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
15. Forest fire-weather investigations.....	\$3,910	\$3,930	\$3,930	---
16. Agricultural meteorological investigations.....	4,027	4,000	4,000	---
17. Climatological investigations.....	5,507	5,600	5,600	---
18. Marine meteorological investigations.....	7,016	8,000	8,000	---
19. Horticultural protection investigations.....	13,707	13,640	13,640	---
20. Commercial airway forecast investigations.....	24,611	25,000	25,000	---
21. Upper-air surveys and investigations.....	40,065	40,000	40,000	---
22. Administrative promotions....	---	---	53,690	+ \$53,690 (8)
Total obligations.....	4,782,689	5,996,870	6,450,560	+ 453,690
Transferred to "Commerce, Bureau of Standards".....	+4,000	+6,000	+6,000	---
Transferred to "Helium Production, Bureau of Mines, Department of Interior".....	10,400	+25,000	+25,000	---
Transferred to "Rent of Buildings in the District of Columbia" Office of the Secretary.....	+2,920	---	---	---
Unobligated balance.....	+42,861	---	---	---
Total appropriation.....	4,842,870	6,027,870	6,481,560	+ 453,690

INCREASES

The increase of \$453,690 in this item consists of:

(1) An increase of \$58,000 for General Forecast and Warning Service, including:

(a) \$49,000 for four maps and forecasts daily. This increase is for improvements in storm warning and weather forecast service in western and Pacific Coast States, where service is now confined to two weather maps a day; also, to extend service in the Southern States, for which areas partial funds were provided in the fiscal year 1940. The increase would provide four weather maps and forecasts daily in many parts of the western and southern areas.

This program will give to agricultural, commercial, and transportation interests and to the public generally more detailed, more accurate, and more frequent forecasts and warnings of storms, cold waves, frosts, etc., a service worth millions of dollars annually to the public. It will make provision for forecasts at the start of the business day and give service at six-hour intervals. Weather changes often take place rapidly, and storm developments not apparent on a given chart are sometimes made evident by observations taken six hours later. These changes often are of vital importance. Timely service can be given only by charting the reports every six hours and by issuing forecasts and warnings based thereon. Another important feature is that morning newspapers which go to press about 2 a.m. Pacific time will be enabled to give subscribers timely forecasts for planning their day's activities.

(b) \$9,000 for teletype installations in city offices. This item is for the purpose of placing in four city offices teletype machines and connecting them with the teletype lines of the Civil Aeronautics Authority over which flow weather observations taken on scheduled hours four or more times a day at about 800 places in the United States, Canada, Alaska, etc. These observations are now available at airports located in or near the cities requiring teletype installations. By this means these four city offices will have the benefit of comprehensive weather information night and day for a service to agricultural, commercial, and maritime interests comparable with service now furnished to aviation activities and at a cost far less than is possible in any other way. Telephoning or telegraphing these reports would not only cause delay and introduce transcription errors but would actually cost more than teletype. City offices where these machines will be installed are to be selected from the following list: Dallas, Tex., Binghamton, N.Y., Akron, Ohio, Atlantic City, N.J., Lansing, Mich., Dayton, Ohio, Lincoln, Nebr., Mobile, Ala., Raleigh, N.C., Shreveport, La., Springfield, Mo.

(2) An increase of \$25,000 for expanding and improving the climatological service, providing additional cooperative stations to fill the gaps in the observing network in significant drought areas and elsewhere and the personnel and improvements necessary to supervise the taking of observations and reports.

The urgent needs of agriculture and other fields in climatology are stressed in a recent letter from Mr. H. D. Hughes of Iowa, a member of the Weather Bureau Advisory Committee, to Dr. R. A. Milliken, its chairman, from which the following is quoted: "From my observations of the climatological service in Iowa it seems evident that this field of the Weather Bureau is not being half covered as judged by the activities mapped out for it as published in the Report of the Science Advisory Board 1933-34 and 1934-35 * * * * * Here in Iowa a committee of the State Planning Board made/careful survey about two years ago of the climatological needs of all agencies interested and recommended the immediate expenditure of about \$60,000 for equipment, the addition of 8 men to the climatological center staff in Des Moines, and an additional annual maintenance fund for personnel and equipment of \$55,000".

The increase in personnel would provide for one additional employee at 9 of the larger field section centers, and 2 clerical positions in Washington to take care of the additional work. This will only partially relieve the serious personnel situation at climatological centers.

(3) An increase of \$17,000 for the establishment of a weather observing station at Swan Island, W. I., to provide upper air and radio-sonde observations. Swan Island is a U. S. possession strategically located in the Caribbean Sea between Cuba and Yucatan near the path of tropical storms which are likely to affect the United States. Complete observations, surface and aloft, from a fixed station will be of the utmost value in determining the future movement and development of such storms (hurricanes). They will supplement observations from ships which always are insufficient and frequently missing altogether, especially when a hurricane is in progress.

Owing to the destructive storms in this area, the Cuban government has been insistent that it be granted permission to establish a station on Swan Island if the United States cannot provide meteorological observations therefrom. Cuba already has established stations on other islands in the Caribbean and in South America. It is desirable however that the United States do so in this case as Swan Island is a United States possession. A temporary weather station was established on Swan Island by the Weather Bureau in cooperation with the Navy Department during a portion of the 1938 hurricane season and is being operated under the same conditions during the 1939 season. However, the Navy Department has advised that it will be impracticable to continue this arrangement after the termination of the present season.

Continuation of observations from Swan Island are considered to be highly important, not only in the protection of shipping, but in the warning of the approach to our southern coasts of the most destructive type of storms to which this country is subject. Operation of a station on Swan Island is especially urgent now that devices are available by which knowledge of conditions in the upper air which are believed to influence the formation, direction of movement, and intensity of hurricanes can be secured. It is the purpose to locate apparatus, radio men and observers on the island for a period of six months each year, covering the full period of hurricane season.

The total amount of funds needed to purchase apparatus and other equipment required for the radio transmitters, receivers, and radiosonde observations and to maintain the necessary personnel for a period of six months is \$30,600. With the \$13,600 now being expended for a temporary station at Swan Island, the increase of \$17,000 requested will provide the amount necessary to carry out this program.

(4) An increase of \$75,000, for the reorganization and expansion of the river and flood service.

The river and flood service of the Weather Bureau has had the responsibility, by law, of forecasting river stages and issuing flood warnings since 1872. The officials at its established offices along the principal rivers have been enabled to conduct this work satisfactorily largely

because, on the larger rivers, the height of an expected flood can be estimated from upstream stages.

Since 1936 there has been an increasing demand for river forecasting service in the valleys of headwater and tributary streams. As the service is extended into these areas the difficulties and costs are multiplied. Under headwater conditions it is necessary to base the prediction of the flood crest and the hour of its arrival on rainfall rather than on stream stage data, and to increase the comparatively few rainfall and snowfall reporting stations now available to a number sufficiently great to determine rainfall throughout the river basin.

Significant advancement has been made in the development of flood forecasting methods, which cannot now be taken advantage of without additional funds. Specifically needed are:

- (a) A materially greater number of reports from rainfall-snowfall stations in each river forecasting district.
- (b) Additional stage reporting stations in selected "index" watersheds.
- (c) Additional personnel in each forecasting center, qualified in the field of applied hydrology, who shall devote the necessary time to forecasting and to the development and improvement of forecasting methods.
- (d) Regional facilities established at key river centers to supervise the work of several districts having like hydrologic characteristics, to organize regional data, and to integrate and coordinate the forecasting work between river districts within the region.

The Bureau's flood forecasting service has obvious, but as yet unevaluated, potentialities in the management and operation of the Nation's streams. There are many situations of flood hazard for which, for either physical or economic reasons, flood control works are not feasible. In such cases, an adequate forecasting service will go far toward keeping flood losses at a minimum by providing the greatest possible preparation-opportunity through a modern forecasting service that will not only use effectively the more recently developed methods of predicting run-off, but will take full advantage of the Weather Bureau's meteorological and aerological services which are indispensable to the forecasting of flood-producing rainfall and snow melting temperatures. The relatively low expense of maintaining such a service will be justified many times over.

The river and flood service has had to bear the responsibility of forecasting floods throughout the country and in every month of the year under appropriations of less than \$200,000 annually. The amount recommended for the extension of the service totals \$75,000, which is to be compared with an estimated flood damage of about \$80,000,000 annually and reported annual savings credited to the forecasting service of nearly \$14,000,000.

- (5) An increase of \$25,000 to provide for correcting some of the serious deficiencies in fire-weather forecast service in forested areas

of the United States, and for extending the service to additional forested areas which have greatest need therefor. Fire control measures are organized in a large part of the 517 million acres of forest land requiring fire protection, for which approximately \$11,000,000 is expended annually by Federal, State, and private forestry organizations. The fire-weather forecast service is designed to provide specialized and localized weather forecasts for the use of the forest protection agencies in the prevention and suppression of forest fires. This requires qualified forecasters to work in close cooperation with forestry officials. In densely forested areas of the West, where a large proportion of fires are caused by lightning and where fires often attain large size, a supplemental weather forecast service is required to assist in bringing the fire under control. Trucks manned with experienced meteorologists and equipped with radio apparatus (receiving and transmitting) and meteorological instruments travel on call to the site of the fire and become a part of the fighting organization. One additional mobile unit and personnel therefor are provided for in these estimates. Thus far funds have been sufficient to extend this service to only a limited portion of the forested areas, although its need in other large forested sections has been repeatedly stressed by the Forest Service and other agencies, and demands have become insistent that fire-weather forecast service be provided. Appropriations requested will allow extension into areas of greatest need.

Daily forecasts are used as an aid in the direct control of fires and to determine man power and equipment required to handle the current situation. The U. S. Forest Service has developed a systematic method of integrating measured weather elements to secure a daily rating of current fire danger on a numerical scale which can be translated in terms of strength of fire organization. Maximum benefit from this rating system will be reached when weather forecast enables the Forest Service to determine class of organization required for protection on the following day. This depends upon specific fire-weather forecasts. Extension of fire danger rating methods to protected areas make an adequate fire-weather service indispensable.

(6) An increase of \$100,000 under the project, "Commercial Airways Meteorological Service", to provide additional meteorological reports for the safety of flying along established routes for air navigation. The airways in the western half of the country are exposed to the low clouds and fog characteristic of that region and to the storms which move in from the Pacific, sometimes rapidly and with little warning. These hazards to aviation are minimized if warnings are distributed sufficiently in advance so that alternate flying routes may be used or, if necessary, flights cancelled before the aircraft are forced down in dangerous mountain regions. During the past several years there have been aircraft accidents and passenger casualties resulting directly from unexpected wind and weather conditions for which adequate warnings could not be issued because of lack of weather reports showing storms which were moving in from the westward. To minimize these hazards it is proposed to:

(a) Increase the number of reports from ships in areas of the North Pacific Ocean from which weather conditions affecting our airways arise. Between 40 and 50 additional reports would be provided for each weather map, that is, 4 times daily.

(b) Permit ships to transmit reports every 6 hours instead of only twice daily as at present.

(c) Reports would be made in a complete code form, including clouds, visibility, rainfall, and other pertinent information, instead of in the present abbreviated code.

(d) Arrange for 4 ships of American registry to take upper wind observations so that some information of the structure of atmospheric conditions over the ocean which give rise to coastal storms will be received.

(e) Provide personnel at the airways forecast center and the ship report receiving center in the San Francisco area to handle these increased reports, and place supervisors at Seattle and San Francisco to arrange for ship observations, check the accuracy of procedure and reports, and instruct ship observers.

(f) Establish a 24-hour airport station, manned by full-time civil-service Weather Bureau employees at Elko, Nev., where pilots may obtain necessary information regarding approach to major terminal at Oakland during bad weather conditions.

A service as outlined above would safeguard not only commercial flights but would aid directly in flights of Army and Navy aircraft in the western part of the country and between the United States and Hawaii, a service which has been urgently needed for several years.

The estimates also provide for a station at Allentown, Pa., a point where full-time civil-service Weather Bureau employees are needed to furnish necessary weather information used in approach to major New York airways terminals, as well as to aid in safeguarding airways traffic through the Alleghenies.

(7) An increase of \$100,000 under the project "Upper Air Soundings" to establish four additional radiosonde stations in the United States and two for 10 months each year on ships at sea. Radiosonde observations provide the "sampling" of the atmosphere necessary to analysis and scientific weather forecasting. These observations give a cross-section of conditions of temperature, humidity, pressure, cloud stratification, icing, etc., existing up to ten or more kilometers, over a station at a given time. Such observations are not only of value, therefore, to aviation but to all activities interested in meteorological conditions. At present, there are 26 such stations operated by the Weather Bureau in the continental United States and its contiguous islands (Swan Island and Puerto Rico), and the Navy and War Departments operate eight airplane or radiosonde stations in the United States and three in outlying territories (Pearl Harbor, T. H., Coco Solo, C. Z., and St. Thomas, V. I.), the reports from which are used by the Weather Bureau. These observations are made only once each day, and the resulting network is so sparse as to provide only an approximation of the detailed structure of the atmosphere, the positions and extent of fronts, icing conditions, turbulence, etc., over the country. Furthermore, no upper-air temperature-pressure-humidity observations are available from the Atlantic and Pacific Oceans except at the places named above and, therefore, no information concerning the distribution of the meteorological

elements in the atmosphere over these vast areas is available. This results in many severe conditions arriving on the coasts of the United States without adequate warning. Continuance of expansion in the number of radiosonde stations is, therefore, necessary if proper forecasts and warnings for all activities are to be made available. The program outlined below, which is a part of the program recommended by the Civil Aeronautics Authority, represents only a minimum increase in activity necessary to fill in some of the more glaring gaps in the present network.

Specifically, the program and the costs thereof are as follows:

(a) Four new radiosonde stations in the United States to fill gaps in the present network of such stations (tentative locations):

1. Brownsville, Tex.....	\$16,900	3. Lake Charles, La....	\$16,900
2. Detroit, Mich	16,900	4. Tallahassee, Fla....	<u>16,900</u>
		Total, 1 to 4	<u>67,600</u>

(b) Establish radiosonde observations on two ships at sea for 10 months each year:

\$11,780 per ship station; \$23,560 total for two ships.

(c) Central Office personnel necessary to organize, direct and administer the above program and to work up and publish results, \$8,840.

(8) \$53,690 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

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WORK UNDER THIS APPROPRIATION

General.--This appropriation provides for the conduct of all service activities of the Weather Bureau necessary for the maintenance of nationwide meteorological activities serving agriculture, commerce, and many other special interests, as well as the general public. The work consists of the collection and dissemination of meteorological data and the issuance and distribution of weather forecasts, warnings, and advices, as well as the basic research essential thereto. The advisory and warning services, including those in connection with the occurrence of storms, hurricanes, cold waves, frosts, fire-weather conditions, and floods, are fundamental purposes set forth in the organic act creating the Weather Bureau.

In accordance with the Civil Aeronautics Act of 1938, meteorological service and forecasts are provided for the protection of aviation on civil airways upon recommendation of the Civil Aeronautics Authority. In addition, upper-air soundings and investigations are conducted under this appropriation in aid of air navigation and in connection with general weather forecasting.

1. General Forecast and Warning Service.--The preparation and dissemination of weather forecasts and warnings constitute a fundamental activity of the Bureau, and for this purpose Congress originally authorized a Federal weather service in 1870. Under this project the Bureau is required to take, record, encipher, telegraph, and compile regular meteorological observations; to issue general and local weather forecasts daily, and frost, cold-wave, and other special warnings and forecasts whenever injurious weather and temperature conditions are expected; and to disseminate weather forecasts, warnings, and synopses by telephone and telegraph, by printed bulletins, maps, and forecast cards, and through cooperation with the newspapers, radio broadcasting stations, and by other available means, for the benefit of agriculture, commerce, and navigation in all parts of the United States and in adjacent ocean areas. Synoptic weather observations are collected by telegraph, radio, telephone, and teletype and are immediately charted. Skilled and experienced forecasters who have a thorough knowledge of the physical processes involved are able to determine therefrom the weather changes that will ensue. The forecasts and warnings to be prepared are promptly and widely disseminated.

2. Climatological Service.--The climatological service was established by an Act of Congress (15 U.S.C. 311-313, 317), effective July 1, 1891, which charged the Weather Bureau with collecting meteorological data sufficient to establish the climatological characteristics of the United States. The work covers the collection and publication of climatological data for all parts of the United States, including the preparation of maps to show normal climatic conditions in different sections of the country. It involves the maintenance of 5,000 cooperative and other meteorological stations, for which daily, monthly, and annual reports of temperature, precipitation, etc., are compiled and published. Forty-two separate monthly and annual reports are published, and data for the entire country are issued annually in the United States Meteorological Yearbook. Summarizations appear in Bulletin W for all past years of record.

3. Hurricane and Storm Warning Service.--Issuance of storm warnings for the Great Lakes was authorized by Congress in 1870. The service has since been extended to the Atlantic, Pacific, and Gulf coasts, and the use of radio on shipboard has resulted in extension of the service to ships at sea. The Weather Bureau must locate and follow storms, including those of tropical origin (hurricanes) by means of synoptic observations assembled on weather charts; furnish information as to the location, intensity, and movement of storms; and issue warnings of their approach (including prediction of dangerous winds and tides which sometimes attend them) for the benefit of mariners and residents of seacoast and lakeshore sections. Observations are collected by radio and cable from West Indian stations and by radio from ships at sea to supplement the regular collection for general forecast purposes. Advices and warnings are disseminated by telegraph, telephone, and radio, and displays by means of flags and lanterns at nearly 300 storm-warning display stations located at ports along the coasts of the Atlantic and Pacific Oceans, the Gulf of Mexico and the Great Lakes. During the hurricane season from June 16 to November 15, inclusive, the Weather Bureau operates a teletype system connecting its offices on the coast of Florida and the Gulf of Mexico by which observations are exchanged between stations and warnings instantly communicated from forecast centers to threatened localities.

4. River and Flood Service.--The river and flood service was inaugurated in 1870 with the installation of a few river and rain gages. The organization now consists of 73 river forecasting centers through which approximately 700 river stations, 350 rainfall stations, 84 snowfall stations, and 76 evaporation stations are administered, the whole being under the administrative control of the River and Flood Division. The primary object of the service is the issuance of river stage and flood forecasts for the saving of life and property and for the benefit of agriculture, navigation, and flood control. The service is particularly essential in organizing flood disaster relief and in planning organized evacuation of flooded areas. The flood forecasting service is known to be the means of saving annually millions of dollars worth of property and as planned for the future can be expected to reduce materially the average annual loss which is now approximately \$100,000,000. The river stage forecasts made from day to day are of vital importance to navigation interests, to the operation of river control works, and to construction work in progress along rivers. Snowfall depths and density measurements have been made at 84 snowfall stations. Forty-seven of the snowfall stations have been equipped with batteries of storage snow gages. Evaporation losses have been measured at about 76 evaporation stations throughout the country.

5. Forest Fire-Weather Service.--Fire-weather warnings were first issued in 1916 as a regular service from district forecast centers. In succeeding years several independent fire-weather districts were organized with specialists assigned to the work. Seven separate districts are now maintained. In the conduct of this work meteorological data from fire-weather substations in forested areas are collected and compiled to ascertain the influence of current weather conditions on the frequency and spread of fires. Daily observations obtained by telegraph, telephone, and radio from these substations are utilized in the preparation of special

forecasts and warnings, which are issued to Federal, State, and private agencies engaged in the protection of forests from fire. Acting upon the forecasts and warnings, forestry officials augment, deploy, or concentrate their fire-fighting forces in accordance with the indicated weather and hazard conditions. In western districts this program is supplemented by an intensive service designed to aid in controlling individual fires. Truck units, equipped with two-way radio, meteorological, and compact office facilities, are dispatched on call to the scene of large going forest fires, where they become an integral part of the fire-fighting organization. They are essentially portable meteorological offices at which detailed weather reports are collected by radio and from which the forecaster in charge issues timely predictions of vital importance to fire control officers in formulating suppression tactics.

6. Agricultural Meteorological Service.--In 1872 the Signal Service of the War Department published the first weather bulletin in the country, containing a summary of weather as affecting agriculture. This was finally developed into what are now known as "Corn and Wheat and Cotton Region Bulletins" and "Weekly Weather and Crop Bulletins", which are published at Washington and certain field stations. This project provides for the collection and publication of data relating to current weather conditions and their effect on crop growth and agricultural operations in general. Publication of the data and determination of their effect on crop growth and farm work are based largely on reports from numerous weather observers and weather and crop correspondents in all sections of the United States and on known relations of weather to crops established by investigations and research in the field of agricultural meteorology.

7. Marine Meteorological Service.--Service work on ocean meteorology has been conducted by the Government for almost a century. The Navy and (successively) the Army and the Weather Bureau have maintained individually or cooperatively the continuity of this activity since 1844. The Weather Bureau is now specifically designated by law (5 U.S.C., 458a) to conduct the major lines of work in ocean meteorology and to furnish meteorological information published on the Pilot Charts and in Sailing Directions and Naval Air Pilot Books issued by the Hydrographic Office of the Navy. The primary objects of the project are the maintenance and improvement of ocean weather observations and reports through an extensive program organized for rapidly collecting, charting, and summarizing the reports to provide maritime commerce and aviation with accurate, properly digested meteorological information and at the same time to secure data for basic studies of weather conditions and storms affecting the continental United States and the adjacent oceans. Daily weather observations at sea are taken and reported in prescribed form by ships' officers using (in the main) meteorological instruments that are regularly a part of a ship's instrumental equipment. Contacts with the observing officers and supervision of the meteorological instruments are largely accomplished through 30 field offices of the Weather Bureau located at major ports of the United States and its island possessions.

8. Horticultural Protection Service.--With the advent of a systematic practice of protecting orchards and truck gardens from frost, specialized local forecasts, as an aid in protecting operations, became necessary.

The special Horticultural Protection Service of the Weather Bureau began in 1917. The work consists of specialized local forecasts for the use of fruit and truck growers in their frost-protection work; also advice as to best methods of protection. The forecasts are made from synoptic weather charts and current local observations, including hygrometric formulae applicable to the particular locality.

9. Commercial Airway Meteorological Service.--Intensive weather service for air navigation was inaugurated by the Weather Bureau soon after passage of the Air Commerce Act in May, 1926. At the close of 1926 the transcontinental airway was the only one on which flights were being made both day and night. Since that time the airway weather service has expanded with the increased number of Federal airways. In 1939 there were approximately 23,658 miles of airways over which 24-hour weather service was maintained and approximately 12,000 miles over which service was maintained on a less than 24-hour basis. The airway weather service is maintained to provide the maximum amount of safety possible in air navigation so far as weather is concerned.

Specific and accurate weather information is essential in air travel, particularly as regards ceiling heights and visibility. The airways weather service consists primarily of hourly reports from stations on the airways and 6-hourly reports from off-airway stations, thus providing a dense network of reports over the country as a whole. These reports are collected at 13 designated centers where they are charted and aviation forecasts prepared. These forecasts are promptly distributed over the airways network, chiefly by means of teletype and radio, with special advices at 3-hourly intervals whenever important weather changes justify.

10. Upper-air Soundings.--Observations in the upper-air were begun in 1898 by the use of kites and captive balloons. Airplane observations began to displace kites and captive balloons in 1931 and wholly supplanted them in 1933.

In July, 1934, the Weather Bureau operated 6 airplane observation stations by contracting with commercial flyers, and the War and Navy Departments made airplane observations at approximately an equal number of stations each. With the further development of radiosonde balloon observation equipment the Weather Bureau operated 3 such stations during the fiscal year 1938 and 6 during the following year. In addition to the latter 6 radiosonde stations, 6 airplane observation stations were continued. Owing to the superiority of radiosondes over airplanes for upper-air observations, airplane observations are being discontinued by the Weather Bureau during the fiscal year 1940 and 28 radiosonde stations are being established. The War Department will operate 2 radiosonde stations and the Navy will change over from airplane observations to radiosondes at 4 stations, bringing the total of the latter type of Navy stations to 5. The Navy will continue airplane observations at 4 stations. The Canadian Meteorological Service will operate 3 airplane observation stations, from which reports are transmitted daily to the United States.

Pilot-balloon observations were inaugurated by the Weather Bureau in 1918, the number of stations increasing steadily so that by the end

of the fiscal year 1940, 141 stations are expected to be in operation. Pilot balloon observations are made 4 times daily and provide wind direction and velocity data for various elevations above the ground.

All the upper-air reports referred to above are transmitted over the Federal airway teletype circuits and are used in the forecasts issued by the Bureau. The records are summarized and forwarded to the Central Office weekly, and the monthly means published regularly in the Monthly Weather Review.

11. Meteorological Physics.--A knowledge of the physical processes that occur in the atmosphere is basic to an efficient meteorological service. Studies along this line have been made in the past with important results, but they are even more necessary and valuable now in view of the more abundant and more accurate data available on land, at sea, and in the air and the increasing use of the knowledge of physical processes in all practical applications of meteorology. The object of the work is to advance our knowledge of physical conditions and processes in the atmosphere that produce weather phenomena, including the distribution and effects of solar radiant energy, and to adapt the results of theoretical investigations to the needs of the practical work of the Bureau. One or more technical problems are under specific investigation at all times. The current literature on technical subjects relating to meteorology is read and digested in order to keep fully informed of every new development. Continual contact is maintained with others conducting scientific research in related fields.

12. Forecast Improvement Investigations.--Studies for the purpose of improving the accuracy and extending the period of weather forecasts have been carried on currently since the establishment of the Weather Bureau. Such studies have resulted in a better understanding of the physical problems involved and in improved service to the public. The work covers investigations of the causes of weather changes in an endeavor to ascertain the physical basis of the changes, including the genesis of fronts and disturbances; the formation of rules and principles for the guidance of the forecaster, and the development of means for extending the period of the forecasts to cover a month or season. Investigations are carried on at the six district centers where the forecasters alternate monthly between active duty and study. Similar researches are conducted at other field stations. Intensive studies of frontal, kinematic, and thermodynamic analyses of surface and upper-air synoptic charts, including isentropic charts and flow patterns, and of air masses, are prosecuted at the central office in Washington. Files of daily weather maps and the meteorological records, both surface and upper-air, of past months, seasons, and years form the basis of statistical and other investigations.

13. Hurricane Investigations.--Development and utilization of the knowledge of hurricane characteristics and movements were stimulated by the invention and growth of radio communication in the first quarter of the present century. As a result, much additional information is now available as a basis for the investigations. Fully developed hurricanes are attended by winds dangerous to ships at sea and destructive to life and property in coastal sections. Some are accompanied by inundations which cause great

loss of life and property. All available observations from ships at sea and island and coastal stations, including detailed reports secured by mail, are charted for study of each hurricane. The studies concern the movement of hurricanes in relation to kind, amount, and movement of clouds; wind directions and speed at the surface and from pilot balloon observations of the upper air; direction, period, and amplitude of sea swells which precede the hurricane; tides along the coast in advance of the storm center; and the general pressure distribution. In order to secure data regarding the vertical structure of hurricanes, instruments attached to sounding balloons will be sent up from stations located in Puerto Rico, Cuba, and the southern portion of the United States during the passage of these disturbances. Investigations are also being conducted in cooperation with the University of Florida and the University of Puerto Rico to determine the possibility of locating hurricane centers by static emanations.

14. River and Flood Investigations.--This work consists of studies of the relation of precipitation to both ordinary flow and flood flow in streams. River-stage forecasting procedure is supplemented by hydrologic methods of estimating stream-flow from rainfall and other related factors. For this purpose the country has been divided into 10 hydrologic regions. Cooperation is maintained with the Geological Survey and the Commonwealth of Pennsylvania, the purpose of which is to develop an improved forecasting service on the streams of that State. Studies of snowmelt-runoff relationships are being conducted on three experimental watersheds established in Yellowstone Park. Studies of storm rainfall and related hydrologic factors are being conducted in a section of the River and Flood Division for the purpose of providing data essential to the design of spillways and waterways. Evaporation investigations are being conducted cooperatively with the University of Iowa.

15. Forest Fire-Weather Investigations.--The Weather Bureau assists directly in lessening the staggering economic loss caused by forest fires through operation of its fire-weather forecasting service. In order that this service may function most efficiently and effectively, an investigative program is conducted to determine the exact relationship between meteorological conditions and the inception and spread of forest fires, and to improve the forecasts issued. Investigations of this character were instituted in 1924. Studies conducted under this project are aimed in part at a more adequate conception of the complex effects of weather conditions upon fire hazard, and the variations of significant weather elements over areas of varied topography. Such information is essential since it forms the basis for other studies specifically designed to improve the accuracy and comprehensiveness of forecasts furnished protection agencies. Daily observations are compiled by decades, months and seasons; and the extremes and averages of conditions are correlated with fire occurrences. Of particular importance in this program are intensive studies of weather conditions in relation to the occurrence of lightning storms, which are directly responsible for a large numbers of fires.

16. Agricultural Meteorological Investigations.--For many years there have been more or less systematically conducted investigations of the effect of weather on crops. Results of the first extensive investigations

of the Weather Bureau in this field are contained in Weather Bureau Bulletin No. 36, "Relations Between Climates and Crops", by Cleveland Abbe, in 1905. Since then considerable investigational work has been done and the results published. Investigations are made to determine the relation between weather and crops, especially optimum weather conditions for different crops, as an aid, among other things, in determining the areas best suited, from the climatic standpoint, for various crops. Up to the present time the work has been carried on principally through mathematical correlations of temperature, sunshine precipitation, relative humidity, and other weather elements with crop yields.

17. Climatological Investigations.--When sufficient meteorological records became available, for some stations as early as 1870, investigations were begun to determine the climatic characteristics of different sections of the United States, and work of this character has continued up to the present time, becoming more dependable as the length of the records increased. Also from time to time various climatic charts have been prepared and revised as additional data became available. Studies are made to determine the climatic features of the United States and, incidentally, in a meager way, of foreign countries. Climate is a determining factor in economic land use, and for best results in agriculture, in general, and for specific use of land for certain crops, it is necessary to have dependable information as to the normal climate and variations therefrom. Summarizing, studying, charting, and comparing weather records of different sections for long periods of time and the preparation of normal charts for different climatic elements showing geographic distribution of comparable conditions are conducted under this project; also special studies, such as climatic trends, drought frequency, etc., for different areas.

18. Marine Meteorological Investigations.--The study of winds and storms at sea constituted one of the earliest phases of meteorological research because of the extreme importance of ocean weather to transport by sail, and this interest on the part of navigators has continued to the present time. Work under this project involved the analysis of data from accumulated records for application to meteorological problems. The importance of such analyses to determine atmospheric conditions over the oceans is accentuated by the development of air navigation. Research in marine meteorology has the following objectives: (1) Continual revision and improvement of the data required by law to be furnished by the Weather Bureau for publications by the Hydrographic Office of the Navy Department for benefit of maritime commerce; (2) extraction of data from the accumulated records for application to modern problems of ocean transport, including air navigation, air-conditioning and refrigerating of ships, and determination of climatic influences on cargoes moving on routes that encounter a wide variety of weather conditions within the term of a single passage; and (3) investigation into possible relations between the temperature of the ocean surface and the weather conditions on the continents to obtain data useful for application to problems of extension in the range of weather forecasts. Research is being advanced by the development of punch-card methods of statistical analysis, by application of mathematical correlation methods, and by steady increase in properly digested summaries of ocean weather data for study.

19. Horticultural Protection Investigations.--For specialized local frost forecasting for the protection of fruit and vegetables, basic data applicable to the specific localities were necessary, and investigational work to obtain these began in 1917. Various forecasting formulae, etc., have been improved from time to time as longer records became available. Studies are made to determine the relative susceptibility to frost of different localities having varying topographic features, and meteorological data are collected for the preparation of hygrometric formulae as an aid in local forecasting. Investigations are also conducted as to the most effective and economical methods of protecting fruit and vegetable crops from frost damage. Establishment and maintenance of a large number of meteorological stations representing different topographic and other conditions is required to determine temperature and humidity relations in different localities.

20. Commercial Airway Forecast Investigations.--With the accumulation of observational data obtained since the inauguration of intensive airway weather service subsequent to the passage of the Air Commerce Act of 1926, studies have been made with a particular view to determining average flying weather conditions along the airways. Such studies are valuable in laying out new airports and airways and for determining regular flight schedules. Investigations under this project are conducted at the central office at Washington, D. C., and at stations where qualified personnel and the necessary data are available.

21. Upper-air Surveys and Investigations.--Numerous aerological surveys have been made to determine average temperatures, pressures, humidities, densities, winds, etc., at various elevations for different sections of the country, as well as special studies and investigations of upper-air conditions. Upper-air observations are classified and correlated with surface conditions in order to determine significant relationships which may be useful in forecasting or to aid in a better understanding of the mechanics of the atmosphere. All observational data are forwarded to the central office of the Weather Bureau in Washington where they are summarized and classified. The data are then used for making special studies and investigations leading to the improvement of general and airway forecasting, both as regards accuracy and length of time covered; to determine meteorological conditions favorable for the formation of ice on aircraft; to effect improvements in methods of pressure reductions to sea level and to the 5000-foot plane; and to increase our knowledge of the mechanics of the atmosphere.

(f) TOTAL, SALARIES AND EXPENSES, WEATHER BUREAU
Changes in Language

It is recommended that the word "departmental" be inserted preceding the words "personal services in the District of Columbia" in connection with the limitation placed on expenditures for personal services in the District of Columbia.

In addition to the personnel that constitute the administrative division having supervision over forecast activities throughout the country, there has been located in the District of Columbia a corps of weather forecasters whose duty it is to forecast the weather that is to occur thirty-six (36) hours in advance for an area comprising the northeastern section of the country. As these officials serve a restricted area of the country, or a forecast district similar to several others located in the field, they are classified as "field" rather than "departmental" employees as defined by the Civil Service Commission. In the interest of more efficient operation, it has also been necessary to establish in the District of Columbia a field unit to supervise the river and flood work conducted over the watersheds of the Potomac and James Rivers and the rivers situated in Pennsylvania, New York, and the New England States. As the salaries of the personnel constituting these units are chargeable to allotments for the field work of the bureau it is therefore recommended that the word "departmental" be inserted in the D. C. salary limitation, as in the case of the other bureaus of the Department having field services headquartered in the District of Columbia.

SUPPLEMENTAL FUNDS

Projects	Obligated, 1939	Estimated obligations, 1940	Estimated obligations, 1941
<u>Special Research Fund, Department of Agriculture, Weather Bureau: For special research projects</u>	\$34,736	\$33,670	\$22,620
<u>Flood Control, General (Transfer to Agri- culture) Weather Bureau:</u>			
For preliminary examinations and surveys, hydrologic studies	653	25,000	(a)
For preliminary examinations and surveys, hydrologic station net- work	- -	100,000	(a)
Total	653	125,000	(a)
<u>Working Fund, Agriculture, Weather Bureau (War, Flood Control, General):</u>			
For hydrologic studies	47,919	48,504	(a)
For hydrologic station network	- -	275,000	(a)
Total	47,919	323,504	(a)
<u>Working Fund, Agriculture, (Maintenance and Improvement of Existing River and Harbor Works) Weather Bureau: For furnishing special rainfall reports to the District Engineer, Rock Island, Illinois</u>	904	- -	- -
<u>Working Fund, Agriculture, Weather Bureau (Outfits, Coast Guard): For radio- sonde equipment for ice patrol cutters "Chelan" and "Champlain"</u>	10,066	- -	- -
<u>Emergency Relief, Agriculture, Weather Bureau, Administrative Expenses (Transfer from W.P.A.): For admin- istrative expenses</u>	- -	30,000	(a)
<u>Emergency Relief, Agriculture, Weather Bureau, Administrative Expenses (Transfer from W. P. A.): For admin- istrative expenses</u>	- -	1,250	(a)
Total, Supplemental Funds	94,308	513,224	22,620

(a) The Budget Estimates for 1941 for Flood Control and Emergency Relief are not yet available.

(g) WEATHER BUREAU BUILDING, WASHINGTON, DISTRICT OF COLUMBIA.
(Carried under "General Public Works Program")

Appropriation Act, 1940. \$250,000
Budget Estimate, 1941. 250,000

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)
Weather Bureau building. . . .	--	\$250,000	\$250,000

The estimates provide for \$250,000 for continuing the construction of new building facilities for the Weather Bureau, on the site owned by the Federal Government at 24th and M Streets, N. W. An item of \$250,000 for the construction of the first unit was provided in the 1940 Appropriation Act. As indicated in the justification for the initial appropriation, the proposed structure is urgently needed to relieve overcrowding in the present Weather Bureau building, which was designed to serve as a residence, and to provide space suitable for Weather Bureau purposes.

The building will contain five stories and basement and will be of fireproof construction, the frame and floors being of concrete with exterior walls of brick with stone or terra cotta trim. The second unit for which provisions would be made in 1941, will be designed to harmonize with and to become an integral part of the first unit. The entire structure when completed will provide approximately 75,000 square feet of office and laboratory space at an estimated cost of approximately \$815,000.

As stated in the justification for the first unit, the plans call for construction of the new Weather Bureau building in three units. Plans for construction of the 1940 unit are well under way. A portion of the old annex building would be demolished to begin erection of the second unit.

CHANGE IN LANGUAGE

The language of this paragraph has been amended as follows:

(1) By the substitution of the word "second" in lieu of the word "first", to provide for the construction of the second unit of an extensible building for the Weather Bureau in Washington, D. C.

(2) By insertion after the words "said Bureau" of the following clause: "including the employment of such persons and means in the District of Columbia and elsewhere for the preparation of preliminary surveys, plans, drawings, designs, and specifications and estimates, the execution of contracts and supervision, as necessary for the construction and equipment of the building, and". The necessity for this clarifying authority was developed

when initial steps were taken by the Weather Bureau to have the first unit, authorized in 1940, constructed. Owing to the fact that the Bureau has not personnel sufficiently competent to properly plan and supervise the construction of a building of the size here involved, it was believed essential that the project be undertaken by the Federal Works Agency. Since the legislation failed to specifically provide for personal services and other administrative expense some question has arisen as to whether the appropriation is available to cover other than the actual cost of the construction and equipment of the building. In view of the obvious advisability of having this type of permanent structure planned and its construction supervised by a Federal Agency fully and adequately equipped to do so it is recommended that the language be clarified as indicated in the estimates.

BUREAU OF ANIMAL INDUSTRY

(a) SALARIES AND EXPENSES - PREAMBLE

Changes in Language.

The language of this paragraph has been revised in the estimates by eliminating references to Acts which amend the original Act establishing the Bureau of Animal Industry and substituting therefor the words "as amended". It is believed that this change is entirely in the interest of simplicity and removal of surplus language.

Insertion of the word "hereafter" in the clause quoted below will, by making the legislation permanent, avoid the necessity of repeating it from year to year:

"and hereafter the Secretary of Agriculture, upon application of any exporter, importer, packer, owner, agent of, or dealer, in livestock, hides, skins, meat, or other animal products, may, in his discretion, make inspections and examinations at places other than the headquarters of inspectors for the convenience of said applicants and charge the applicants for the expenses of travel and subsistence incurred for such inspections and examinations, the funds derived from such charges to be deposited in the Treasury of the United States to the credit of the appropriation from which the expenses are paid;"

A number of minor changes are also suggested to improve the language without in any way modifying its intent.

(b) GENERAL ADMINISTRATIVE EXPENSES

Appropriation Act, 1940	\$170,120
Budget Estimate, 1941	171,920
Increase	<u>1,800</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
General administration and business service	\$168,532	\$170,120	\$170,120	- - -
Additional for administrative promotions	- - -	- - -	1,800	+\$1,800(1)
Unobligated balance	1,588	- - -	- - -	- - -
Total	(a)170,120	170,120	171,920	+ 1,800

(a) 1939 excludes allotment of \$8,100 transferred in 1940 Act to "General Administrative Expenses," Agricultural Marketing Service (incident to transfer of item "Packers and Stockyards Act").

INCREASE

(1) \$1,800 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

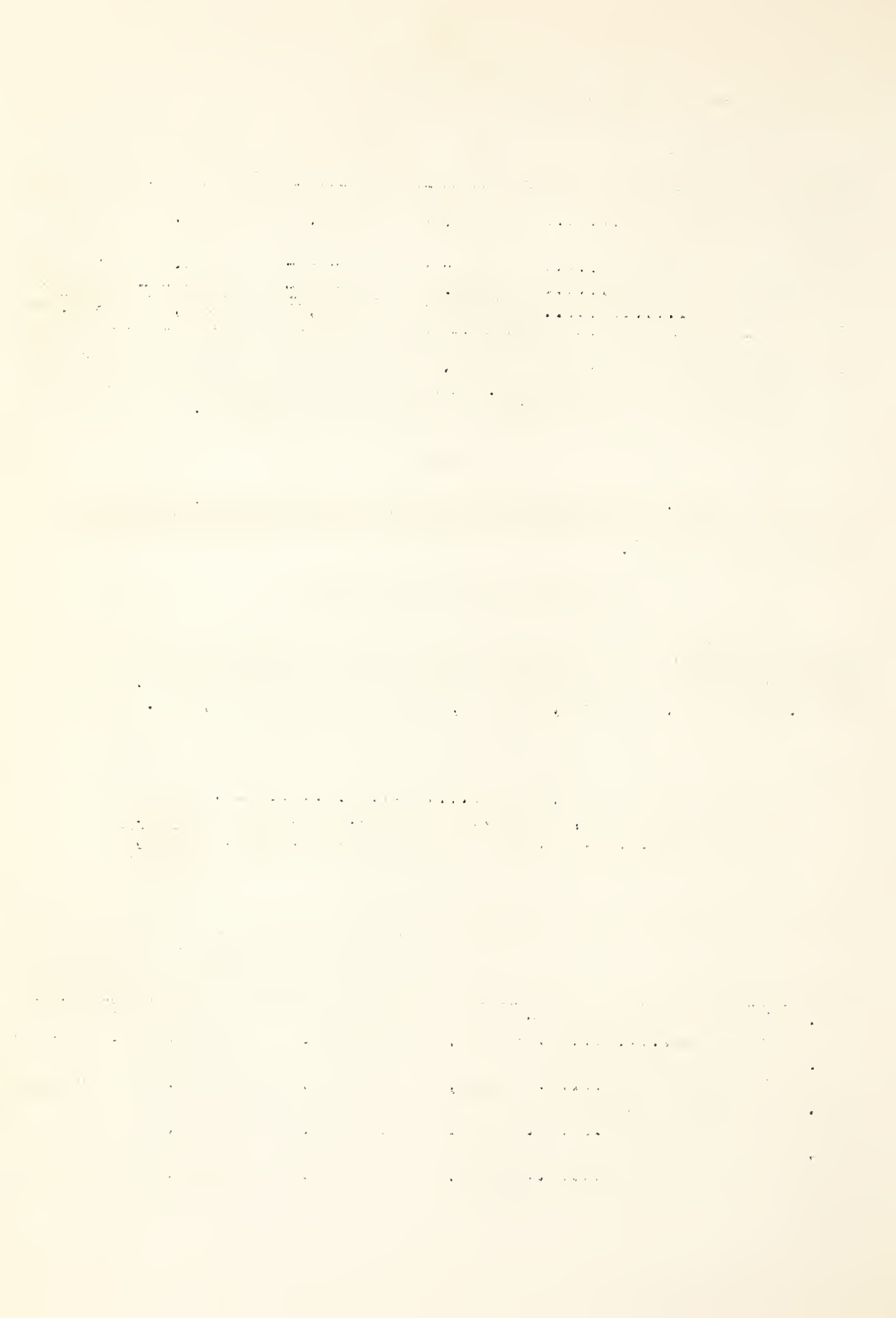
This appropriation is used for activities concerned with the general direction of the research service and regulatory work of the Bureau including the expenses of the Chief of Bureau's office, accounting, personnel, property, library, editorial activities, etc.

(c) ANIMAL HUSBANDRY

Appropriation Act, 1940	\$802,880
Budget Estimate, 1941	804,220
Increase	<u>1,340</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase or decrease
1. Swine husbandry investigations	\$122,445	\$132,622	\$132,622	- - -
2. Sheep and goat husbandry investigations	144,045	148,886	145,386	- \$3,500(1)
3. Horse and mule husbandry investigations	40,883	41,934	41,934	- - -
4. Beef cattle husbandry investigations	163,207	163,361	163,361	- - -



PROJECT STATEMENT - Continued

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase or decrease
5. Dual-purpose cattle husbandry investigations ..	69,720	66,259	66,259	- - -
6. Poultry husbandry investigations	237,635	243,957	243,957	- - -
7. Certification of Pedigrees of imported livestock ..	5,894	5,861	5,861	- - -
8. Additional for administrative promotions	- - -	- - -	4,840	+ \$4,840(2)
Unobligated balance	5,551	- - -	- - -	- - -
Total	789,380	802,880	804,220	+ 1,340

INCREASE AND DECREASE

The increase of \$1,340 in this item for 1941 consists of:

(1) A reduction of \$3,500 in the allotment for "Sheep and goat husbandry investigations", due to the dropping of a nonrecurring item provided in 1940 for the construction of a cottage at Middlebury, Vt.

(2) \$4,840 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

CHANGE IN LANGUAGE

In order to avoid the necessity for changing the fiscal year annually in the estimates, it is proposed to strike out the phrase "During the fiscal year 1940" and to insert in lieu thereof the words "during the fiscal year for which appropriations are herein made." Similar changes have been made previously in all the other items of the Bureau.

WORK UNDER THIS APPROPRIATION

General.---The animal husbandry investigations of the Bureau of Animal Industry deal with the collection and dissemination of information on livestock problems of regional and national importance having to do with the breeding, feeding, and management of domestic farm animals, including poultry. Results are measured in terms of quantity and quality of the animals and their products, such as meat, eggs, wool, mohair, and farm power. These experiments often are conducted in cooperation with other bureaus and divisions of the Department, with one or a group of

State agricultural experiment stations, with farmers, and with other agencies. During the fiscal year 1939 there was returned to the miscellaneous receipts fund of the Treasury the sum of \$62,270 which was received from the sale of animal products which had served their purpose for investigational work.

1. Swine Husbandry Investigations. --This work includes studies to identify and develop strains of swine and to develop methods of feeding and management that will make possible the production of pork economically and profitably; and studies on conformation and yields, proportion of meat to bone, composition, tenderness, flavor, juiciness, and other characteristics of pork and pork products as influenced by variations in production factors and in processing and preparation, including slaughtering, chilling, cutting, curing, rendering of lard, storing, canning, and cooking. Swine normally represent about 10 per cent of the value of all agricultural production in this country. Many problems exist and new problems are constantly arising which call for solution. Results achieved have been highly valuable, and continuation of the work is undoubtedly essential if the needs of the industry are to be served.

2. Sheep and Goat Husbandry Investigations. --This work deals with the factors affecting production of lamb meat, wool, goats' milk, and mohair. Studies in breeding and development of types most suitable for production and studies in the methods of management and feeding are made with sheep and goats and the results tabulated and interpreted for other workers and for the industry. The experimental animals are of known ancestry for many generations back. Data are kept on them from birth to slaughtered carcass, including such factors as productivity, rate of growth, earliness of maturity, and quality of production. Many of the new principles which have resulted from these studies in the past have been made use of by the sheep and wool and mohair industries.

3. Horse and Mule Husbandry Investigations. --This project consists of studies in breeding, feeding, management, cost of production and maintenance, and utilization of horses and mules, including work with both light and draft breeds of horses and physiological studies in the rearing of orphan foals. Information on stallion enrollment in the various States having stallion enrollment laws is compiled and distributed. A nationwide shortage of work stock and increased interest in the breeding of horse and mule replacements creates a demand for information looking toward improved breeding stock.

4. Beef Cattle Husbandry Investigations. --This work consists chiefly of research in problems affecting breeding, feeding, and management of beef cattle and the quality of their meat. It includes studies in range livestock production, in feeding and fattening various classes

of beef cattle under both farm and range conditions, beef cattle record-of-performance studies, breeding studies to develop crossbred cattle which will be especially adaptable to certain sections of the United States having unfavorable climate, and the development of strains within the established beef breeds that will have superior germ plasm for efficiency and quality of production. Pasture management and grazing studies, mineral deficiency problems affecting range cattle production, and special vitamin and other nutritive requirements also are dealt with.

5. Dual-Purpose Cattle Husbandry Investigations.--This work consists chiefly of research in problems relating to breeding. It includes studies in the development of true breeding strains of Milking Shorthorn and Red Polled Cattle for high fertility, desirable conformation, and comparatively high production of both beef and milk; studies of the performance of the offspring to determine the relative values of germ plasm of different strains; meat studies to determine the quality of the meat; and studies of the nutritive requirements of dual-purpose cattle for growth and production.

6. Poultry Husbandry Investigations.--The work under this project consists chiefly of research in breeding, feeding, hatchability, and flock management. The breeding studies are conducted for the purpose of enabling producers to develop, through selection and breeding, more efficient egg and meat producing strains to improve the quality of eggs, breeding stock, and poultry meat. Studies in poultry nutrition are carried on in order to develop efficient diets for all classes of poultry and to develop methods for the most efficient utilization of feed in order to promote the most economical production of eggs and poultry meat of superior quality. Other lines of research embrace a study of fundamental principles involved in various physiological practices associated with the production of poultry and poultry products and studies on the most efficient methods of incubation.

Cooperation is had with the States through official State agencies in putting into effect the regulations of the National Poultry Improvement Plan which are designed to improve the quality of hatching eggs, baby chicks, and breeding stock produced by those participating in the plan. Over 6,000,000 farmers raise poultry, and there are several thousand commercial poultry producers. There are over 400,000,000 laying hens kept in the United States annually and the average egg production is approximately 90, whereas improved methods of feeding and proper selection could readily increase this to 150, and further improved methods to an average of 170. Approximately 800,000,000 chicks are raised in the United States annually, most of them in commercial hatcheries, of which there are approximately 12,000.

7. Certification of Pedigrees of Imported Registered Livestock.--This work is regulatory and consists of the certification of purebred animals imported into the United States under the provisions of paragraph 1606 of the Tariff Act of 1930. It comprises the examination of pedigrees of the animals imported and certification to the Collector of Customs at the port of entry free of duty.

(d) DISEASES OF ANIMALS

Appropriation Act, 1940	\$462,000
Budget Estimate, 1941	<u>466,100</u>
Increase	<u><u>4,100</u></u>

PROJECT STATEMENT

Projects	1939	1940 :(Estimated):	1941 :(Estimated):	Increase
1. Investigations of nonpara-				
sitic diseases of livestock:				
(a) Investigations of equine				
encephalomyelitis and				
forage poisoning	\$18,882	\$19,090	\$19,090	---
(b) Investigations of ana-				
plasmosis of cattle	11,297	11,415	11,415	---
(c) Investigation of rabies.	5,292	5,315	5,315	---
(d) Investigation of swine				
erysipelas	6,657	6,920	6,920	---
(e) Investigations of miscel-				
laneous diseases, includ-				
ing glanders, blackleg,				
para-typhoid infection of				
swine, foot-rot, alkali				
disease, and other miscel-				
laneous diseases and				
pathological conditions				
of animals	24,233	23,518	23,518	---
(f) Investigations of con-				
tagious abortion (Bang's				
disease) of animals	77,959*	78,182*	78,182*	---
(g) Investigations of stock				
poisoning by plants	20,441	20,650	20,650	---
(h) Diagnosis and general				
investigations of poultry				
diseases, including				
laryngo tracheitis, range				
paralysis, tuberculosis,				
pullorum disease, and				
fowl pox	29,649	29,890	29,890	---
(i) Investigations of equine				
infectious anemia (swamp				
fever)	14,371	15,000	15,000	---

* See also the appropriation for "Tuberculosis and Bang's Disease."

1. The first part of the paper is devoted to a general discussion of the problem of the existence of a solution of the system of equations (1) for arbitrary values of the parameters α and β .

2. In the second part we shall consider the case when the parameters α and β are small and shall obtain an asymptotic expansion of the solution in powers of these parameters.

3. In the third part we shall consider the case when the parameters α and β are large and shall obtain an asymptotic expansion of the solution in powers of these parameters.

4. In the fourth part we shall consider the case when the parameters α and β are of the order of unity and shall obtain an asymptotic expansion of the solution in powers of these parameters.

5. In the fifth part we shall consider the case when the parameters α and β are of the order of unity and shall obtain an asymptotic expansion of the solution in powers of these parameters.

6. In the sixth part we shall consider the case when the parameters α and β are of the order of unity and shall obtain an asymptotic expansion of the solution in powers of these parameters.

7. In the seventh part we shall consider the case when the parameters α and β are of the order of unity and shall obtain an asymptotic expansion of the solution in powers of these parameters.

PROJECT STATEMENT - Continued

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
(j) Studies to determine whether agents other than tubercle bacilli cause sensitization to tuberculin; the relation of types of acid-fast organisms to tubercle bacilli; the value of reputed immunizing agents	\$22,223	\$22,500	\$22,500	---
(k) Determination of various types of tubercle bacilli in the diagnoses of the disease	3,184	3,000	3,000	---
(l) Investigations of paratuberculosis (Johne's disease) of cattle	2,979	3,000	3,000	---
(m) Investigations of methods of producing immunization against hog cholera	21,775	22,495	22,495	---
(n) Investigation of modes of dissemination of hog cholera	4,520	5,025	5,025	---
(o) Investigations of periodic ophthalmia of equines	11,717	10,000	10,000	---
Total, Investigations of non-parasitic diseases of livestock	275,179	276,000	276,000	---
2. Investigations of parasitic diseases of livestock:				
(a) Index catalog of medical and veterinary parasitology and maintenance of parasite collection ...	8,243	8,500	8,500	---
(b) Investigations of poultry parasites	21,585	20,300	20,300	---
(c) Investigations of swine parasites	23,427	22,800	22,800	---
(d) Investigations of parasites causing and transmitting anaplasmosis in cattle	10,610	11,300	11,300	---
(e) Investigations of ox warbles in cattle and of related arthropod parasites	29,099	30,000	30,000	---

PROJECT STATEMENT - Continued

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
(f) Investigations of liver flukes in ruminants	\$16,558	\$15,900	\$15,900	---
(g) Investigations of in- ternal parasites of ruminants	18,765	24,300	24,300	---
(h) Investigations of horse parasites	9,033	11,300	11,300	---
(i) Investigations of miscel- laneous parasites, includ- ing parasites of dogs, cats; wild animals, etc.	17,501	16,300	16,300	---
(j) Investigations for the development of anthel- mintics and insecticides for the destruction of parasites	15,351	15,300	15,300	---
(k) Investigations on trichinosis in swine	---	10,000	10,000	---
Total, Investigations of para- sitic diseases of animals ...	170,172	186,000	186,000	---
Additional for administrative promotions	---	---	4,100	+ \$4,100(1)
Unobligated balance	1,649	---	---	---
Total	447,000	462,000	466,100	+ 4,100

Date	Description	Amount	Balance	Total	Remarks
1911					
Jan 1	Balance	100.00	100.00		
Jan 2	Jan 1	100.00	100.00		
Jan 3	Jan 2	100.00	100.00		
Jan 4	Jan 3	100.00	100.00		
Jan 5	Jan 4	100.00	100.00		
Jan 6	Jan 5	100.00	100.00		
Jan 7	Jan 6	100.00	100.00		
Jan 8	Jan 7	100.00	100.00		
Jan 9	Jan 8	100.00	100.00		
Jan 10	Jan 9	100.00	100.00		
Jan 11	Jan 10	100.00	100.00		
Jan 12	Jan 11	100.00	100.00		
Jan 13	Jan 12	100.00	100.00		
Jan 14	Jan 13	100.00	100.00		
Jan 15	Jan 14	100.00	100.00		
Jan 16	Jan 15	100.00	100.00		
Jan 17	Jan 16	100.00	100.00		
Jan 18	Jan 17	100.00	100.00		
Jan 19	Jan 18	100.00	100.00		
Jan 20	Jan 19	100.00	100.00		
Jan 21	Jan 20	100.00	100.00		
Jan 22	Jan 21	100.00	100.00		
Jan 23	Jan 22	100.00	100.00		
Jan 24	Jan 23	100.00	100.00		
Jan 25	Jan 24	100.00	100.00		
Jan 26	Jan 25	100.00	100.00		
Jan 27	Jan 26	100.00	100.00		
Jan 28	Jan 27	100.00	100.00		
Jan 29	Jan 28	100.00	100.00		
Jan 30	Jan 29	100.00	100.00		
Jan 31	Jan 30	100.00	100.00		
Feb 1	Jan 31	100.00	100.00		
Feb 2	Feb 1	100.00	100.00		
Feb 3	Feb 2	100.00	100.00		
Feb 4	Feb 3	100.00	100.00		
Feb 5	Feb 4	100.00	100.00		
Feb 6	Feb 5	100.00	100.00		
Feb 7	Feb 6	100.00	100.00		
Feb 8	Feb 7	100.00	100.00		
Feb 9	Feb 8	100.00	100.00		
Feb 10	Feb 9	100.00	100.00		
Feb 11	Feb 10	100.00	100.00		
Feb 12	Feb 11	100.00	100.00		
Feb 13	Feb 12	100.00	100.00		
Feb 14	Feb 13	100.00	100.00		
Feb 15	Feb 14	100.00	100.00		
Feb 16	Feb 15	100.00	100.00		
Feb 17	Feb 16	100.00	100.00		
Feb 18	Feb 17	100.00	100.00		
Feb 19	Feb 18	100.00	100.00		
Feb 20	Feb 19	100.00	100.00		
Feb 21	Feb 20	100.00	100.00		
Feb 22	Feb 21	100.00	100.00		
Feb 23	Feb 22	100.00	100.00		
Feb 24	Feb 23	100.00	100.00		
Feb 25	Feb 24	100.00	100.00		
Feb 26	Feb 25	100.00	100.00		
Feb 27	Feb 26	100.00	100.00		
Feb 28	Feb 27	100.00	100.00		
Feb 29	Feb 28	100.00	100.00		
Mar 1	Feb 29	100.00	100.00		
Mar 2	Mar 1	100.00	100.00		
Mar 3	Mar 2	100.00	100.00		
Mar 4	Mar 3	100.00	100.00		
Mar 5	Mar 4	100.00	100.00		
Mar 6	Mar 5	100.00	100.00		
Mar 7	Mar 6	100.00	100.00		
Mar 8	Mar 7	100.00	100.00		
Mar 9	Mar 8	100.00	100.00		
Mar 10	Mar 9	100.00	100.00		
Mar 11	Mar 10	100.00	100.00		
Mar 12	Mar 11	100.00	100.00		
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Mar 14	Mar 13	100.00	100.00		
Mar 15	Mar 14	100.00	100.00		
Mar 16	Mar 15	100.00	100.00		
Mar 17	Mar 16	100.00	100.00		
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Mar 25	Mar 24	100.00	100.00		
Mar 26	Mar 25	100.00	100.00		
Mar 27	Mar 26	100.00	100.00		
Mar 28	Mar 27	100.00	100.00		
Mar 29	Mar 28	100.00	100.00		
Mar 30	Mar 29	100.00	100.00		
Mar 31	Mar 30	100.00	100.00		
Apr 1	Mar 31	100.00	100.00		
Apr 2	Apr 1	100.00	100.00		
Apr 3	Apr 2	100.00	100.00		
Apr 4	Apr 3	100.00	100.00		
Apr 5	Apr 4	100.00	100.00		
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Apr 7	Apr 6	100.00	100.00		
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Apr 15	Apr 14	100.00	100.00		
Apr 16	Apr 15	100.00	100.00		
Apr 17	Apr 16	100.00	100.00		
Apr 18	Apr 17	100.00	100.00		
Apr 19	Apr 18	100.00	100.00		
Apr 20	Apr 19	100.00	100.00		
Apr 21	Apr 20	100.00	100.00		
Apr 22	Apr 21	100.00	100.00		
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Apr 24	Apr 23	100.00	100.00		
Apr 25	Apr 24	100.00	100.00		
Apr 26	Apr 25	100.00	100.00		
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Apr 28	Apr 27	100.00	100.00		
Apr 29	Apr 28	100.00	100.00		
Apr 30	Apr 29	100.00	100.00		
May 1	Apr 30	100.00	100.00		
May 2	May 1	100.00	100.00		
May 3	May 2	100.00	100.00		
May 4	May 3	100.00	100.00		
May 5	May 4	100.00	100.00		
May 6	May 5	100.00	100.00		
May 7	May 6	100.00	100.00		
May 8	May 7	100.00	100.00		
May 9	May 8	100.00	100.00		
May 10	May 9	100.00	100.00		
May 11	May 10	100.00	100.00		
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Jun 1	May 31	100.00	100.00		
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Jun 5	Jun 4	100.00	100.00		
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Jul 31	Jul 30	100.00	100.00		
Aug 1	Jul 31	100.00	100.00		
Aug 2	Aug 1	100.00	100.00		
Aug 3	Aug 2	100.00	100.00		
Aug 4	Aug 3	100.00	100.00		
Aug 5	Aug 4	100.00	100.00		
Aug 6	Aug 5	100.00	100.00		
Aug 7	Aug 6	100.00	100.00		
Aug 8	Aug 7	100.00	100.00		
Aug 9	Aug 8	100.00	100.00		
Aug 10	Aug 9	100.00	100.00		
Aug 11	Aug 10	100.00	100.00		
Aug 12	Aug 11	100.00	100.00		
Aug 13	Aug 12	100.00	100.00		
Aug 14	Aug 13	100.00	100.00		
Aug 15	Aug 14	100.00			

INCREASE

(1) The \$4,100 increase in this item represents the additional amount estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--Items under this appropriation include research investigations into the cause, prevention, and treatment of the infectious, non-infectious, and parasitic diseases of livestock, including poultry, and stock poisoning by plants. These investigations include both field and laboratory studies and have for their object the development of the necessary information that will lead to the formulation of methods for the control and eradication of the various diseases and parasites that are the cause of heavy loss to the livestock industry of this country. Complete information as to the cause and mode of transmission of bacterial and parasitic diseases is necessary before the most effective measures can be taken for their control. Research in the past has made it possible to formulate and put into effect practical measures for the control and in some cases the eradication of diseases and parasites of high economic importance. This has resulted in great benefit to the livestock industry. Complete information, however, on many important diseases and parasites is still lacking so that effective measures for the reduction of losses occasioned by them must await further research.

1. Investigations of Nonparasitic Diseases of Livestock.--Under this project, investigations are made into the methods of diagnosis, cause, mode of transmission, and methods of prevention, treatment, and control of the more important infectious and non-infectious diseases of livestock, including poultry. These investigations embrace such diseases as contagious abortion (Bang's disease), equine encephalomyelitis, equine infectious anemia, mastitis of cattle, anaplasmosis, hemorrhagic septicemia, rabies, anthrax, swine erysipelas, hog cholera, tuberculosis, alkali disease, miscellaneous diseases, and such other specific diseases as may assume importance from time to time, and pathological conditions of animals, including the more important poultry diseases such as range paralysis, pullorum disease, pox, tuberculosis, etc. These investigations embrace both field and laboratory activities. Studies of these diseases as they exist in the field are made and the bacteriological, serological, pathological, immunological, and animal inoculation studies are conducted in the laboratory. Investigations are made into the stock-poisoning plants. They include field observations to determine the relationship between poisoning and conditions under which it occurs. The collection and feeding to different animals of suspected plants are carried on and chemical investigations of these plants to isolate and determine the chemical nature of the toxic substance are made. Attempts are made to find practical means either to prevent poisoning or to counteract the effects of the toxic substances.

(a) Equine Encephalomyelitis and Forage Poisoning Investigations.--- Losses in horses in various parts of the country have occurred for many years which until a few years ago had been generally considered to be due to spoiled forage (forage poisoning). Particularly severe losses have occurred in certain years. In 1930 it was shown that a severe epizootic in horses in California was due to an infectious agent, a filterable virus, producing an inflammation of the brain and spinal cord (encephalomyelitis). The specific virus disease has been definitely identified by laboratory means in 27 States and has been diagnosed clinically or pathologically in at least 13 other States. Further work is under way to determine positively the existence of the virus disease in the latter States. Additional information is being sought on the modes of transmission, including an explanation of the manner in which the infection is carried over from one epizootic to another and on improved methods of diagnosis and means of immunizing horses against the disease. During 1938 the virus of this disease was found to be the cause of encephalitis in children in Massachusetts. This is the first authentic report of the infection in man. Recent outbreaks of a somewhat similar disease following in the wake of the virus infection are being investigated.

(b) Anaplasmosis Investigations.---Anaplasmosis is a disease of cattle somewhat similar to "tick fever." It was definitely recognized in the United States in 1924 and now exists in about 21 States. Control measures employed in other countries are not applicable to this country. The objective in these investigations is to determine the modes of transmission of the disease and to develop a serological test for the diagnosis of the carrier animals. Although means of partially controlling the disease have been found, the development of an immunizing agent that is both safe and effective is an object of these investigations, as is also the determination of effective therapeutic means of combating the disease and freeing the carrier animal of infection.

(c) Rabies Investigations.---This project covers studies on the diagnosis and methods of control of rabies in dogs and other animals. In recent years particular attention has been given from time to time to a study of the efficacy of the prophylactic vaccination of dogs as a means of controlling outbreaks of the disease.

(d) Swine Erysipelas Investigations.---It has been found in recent years that swine erysipelas in the acute and chronic form exists in a number of the States. These investigations are conducted in an endeavor to improve on the agglutination test which is now used for diagnosing the disease so that this may be made available for a practical field test for the diagnosis of the disease. Studies are being made on the factors that enhance the pathogenicity of the causative agent of the disease and on outbreaks of the disease in the field, the latter to gain information on control measures. Experiments are being conducted to develop a safe and effective means of vaccination where the disease occurs in large hog-breeding and feeding establishments.

(e) Miscellaneous Disease Investigations.--The diseases falling in this group, which include glanders, blackleg, paratyphoid infection of swine, foot-rot, alkali disease, anthrax, hemorrhagic septicemia, and other miscellaneous diseases and pathological conditions of animals, are at this time subjects for study as occasion demands. While some of these diseases were at one time major problems, earlier special studies resulted in finding effective means for their control. The present activities concerning these diseases are largely those of diagnosis, since proper diagnosis is the first essential in formulating measures to combat outbreaks of disease.

(f) Brucellosis of Cattle (Bang's disease) Investigations.--Bang's disease has for many years been growing in importance until it now ranks first among diseases that plague the dairy and cattle-raising industries. The object of this research is to gain sufficient knowledge of the disease to be able to at least reduce its ravages and, if possible, bring it under control and eradicate it. The incidence of this disease has been materially reduced in many States as a result of a Federal-State cooperative control program based on the test-and-slaughter method. The results of field trials on calfhood vaccination, while as yet incomplete, continue to be favorable and indicate that vaccination may be of value in increasing the resistance of animals in infected herds and thereby greatly increase calf production.

(g) Stock Poisoning by Plants.--The losses in livestock caused by poisonous plants are frequently very severe. It is estimated that the average annual loss is about one million dollars and in some years may reach several times that figure. Work is being carried on to determine what plants are responsible for these losses and to find means to prevent poisoning and to treat affected animals. The cause of a serious disease which has resulted in an annual loss of several thousand sheep has been traced to two poisonous plants. This discovery made it possible to formulate practical means for avoiding the plants and eliminating the losses. Poisoning of livestock by prussic-acid-bearing plants has resulted in losses in every part of the United States. An effective remedy for this type of poisoning has been developed and is being used wherever such plants cause trouble.

(h) Poultry Disease Investigations.--The principal diseases now under investigation are laryngotracheitis, range paralysis, tuberculosis, pullorum diseases, and fowl pox. These are widespread in distribution and are the cause of heavy losses to the poultry industry. In addition, a number of diseases to which poultry are susceptible but which are of lesser economic importance are subjects for study as suitable material becomes available and facilities permit. The objective is to formulate adequate control measures.

(i) Swamp Fever Investigations.--Swamp fever is a widely distributed disease of horses and mules which at times has been of economic importance in certain sections of the United States. In 1927

the disease assumed economic proportions in the Mississippi Delta region, and investigations are now being conducted looking to the development of some treatment that will be effective either as a preventive or as a cure for the disease. Work is being conducted to develop a test for the detection of carriers of the infection as a means of controlling and eventually eradicating the disease.

(j) Tuberculosis and Tuberculin.---The investigation of animal tuberculosis was one of the earliest major projects of the Bureau of Animal Industry. Much has been learned of the nature of the disease, the manner in which it is spread, the methods of diagnosis, and means of prevention and control. Present methods of eradicating the disease are based on this work. The object of this investigation is to gain knowledge relative to the disease which will make possible its eradication in cattle, hogs, chickens, and other animals affected by the different types of tubercle bacilli. With the decrease in the incidence of tuberculosis in cattle, it has become apparent that there are other causes of reactions to tuberculin in cattle than the bovine tubercle bacillus. Studies are being made of the causes of such non-specific sensitization in the hope of developing means of differential diagnosis that may be made applicable to field testing.

(k) Types of Tubercle Bacilli.---In specimens representing lesions found in tuberculin reactor animals slaughtered in connection with the national program of tuberculosis eradication the finding of tubercle bacilli confirms the tuberculin test. The object of this investigation is to determine the types of tubercle bacilli, whether bovine, human, or avian, that are found in these lesions, in order to furnish the information necessary from the standpoint of tuberculosis eradication.

(l) Johne's Disease.---Johne's disease (paratuberculosis) is a malady of cattle which, like tuberculosis, is caused by acid-fast microorganisms. Like tuberculosis, infection in the early stage of the disease can not be detected by clinical means, yet these animals may be spreaders of the infection to healthy cattle. While the disease has been recognized in the United States for a number of years, it apparently is becoming more prevalent and is causing considerable loss, especially in the dairy industry. A diagnostic agent similar to tuberculin and known as Johnin was developed in 1914. A commercially prepared intravenous Johnin became available in 1927 but proved rather unsatisfactory. In 1932 the Bureau began the preparation of an intradermic Johnin similar to intradermic tuberculin. This product, while more satisfactory than the intravenous Johnin, is as yet in an experimental stage. The object of this investigation is to improve the intradermic Johnin, looking to the ultimate development of a diagnostic agent as effective as intradermic tuberculin, and to apply this product in the field for the detection of infected animals so they may be removed from the herds.

(m) Methods of Producing Immunization Against Hog Cholera.--

At times hog cholera has severely injured the hog-raising industry, losses having reached 6,000,000 hogs (valued at \$65,000,000) in a single year. Present methods of immunization are expensive and not invariably safe or successful. A cheaper and more dependable method is being sought, either through improved utilization of virus and serum or through a harmless but effective vaccine.

(n) Modes of Dissemination of Hog Cholera.--Hog cholera is highly contagious. The avenues by which infectious matter is conveyed from sick hogs to well hogs are studied in order to determine where and how infection may be strategically blocked.

(c) Investigations of Periodic Ophthalmia of Equines.--Periodic ophthalmia of equines has been known to exist in the United States for many years and is characterized by a recurring inflammation of the eye which usually terminates in blindness of one or both eyes. The condition is quite widespread, particularly in the Middle West and East. Indications are that the disease is on the increase. While it is rather difficult to estimate the losses occasioned annually by this disease, they are known to be heavy. Little is known about the cause of the disease but it is generally believed to be of an infectious nature of the type of a filterable virus. Research work on periodic ophthalmia is handicapped by the fact that the experiments must be conducted on horses and mules, which makes the procedure quite expensive. As a result, experimental work, both in this country and abroad, has been very limited, and little or no information of practical value in the control of the disease has yet been developed.

2. Investigations of Parasitic Diseases of Livestock.--Investigations are conducted on animal parasites, including studies of their morphology, life history, biology, pathogenicity, and of control measures by means of treatment and prophylaxis. The more important parasite groups covered include the protozoa, nematodes, tapeworms, flukes, insects, and arachnids attacking domesticated and game animals, including birds. The basic work makes possible the precise identification and recognition of parasites and gives the information on which to base control measures. Therapy is established on the basis of critical tests of drugs. Work is conducted along the lines indicated in the projects listed below:

(a) Index Catalog of Medical and Veterinary Parasitology and Maintenance of Parasite Collection.--The object of this project is to maintain a complete catalog and index of the world's literature on parasitology. This index catalog provides a basis for research and affords prompt information in answering correspondence and in solving problems that arise in connection with the Bureau's regulatory work.

(b) Poultry Parasite Investigations.--The poultry industry of the United States suffers large losses because of parasites of poultry, including tapeworms, roundworms, and protozoan organisms that produce coccidiosis and blackhead. The objective of these investigations is to develop methods of protecting the industry from such losses by ascertaining through research effective treatments and control measures.

(c) Swine Parasite Investigations.--Swine parasites are the cause of large losses to the industry. Roundworms, kidney worms, nodular worms, and lungworms interfere seriously with the growth of swine and are important factors in the mortality of young pigs. The object of the work under this project is to lay a foundation of scientific fact on which to build measures for the control of parasites and to make available to the industry the data obtained so that losses may be reduced.

(d) Parasites Causing and Transmitting Anaplasmosis in Cattle.--In 1924 and 1925 it was found that anaplasmosis was prevalent in the United States in areas outside the region in which cattle-fever ticks were present, indicating that the eradication of the cattle tick, although resulting in the suppression of piroplasmosis, did not control anaplasmosis. Consequently the problem of anaplasmosis was made a project for consideration, the object being to ascertain what vectors carry anaplasmosis and to develop control measures of any practical sort.

(e) Ox-Warble and Related Arthropod Parasite Investigations.--The object of this project is (1) to lay a foundation for the eradication of ox-warbles from the United States, since these parasites cause losses, principally by damage to hides, amounting to millions of dollars annually; (2) to develop practical methods of controlling grub in the head of sheep; and (3) to ascertain effective methods of controlling demodectic mange mites of cattle, sheep ticks, and other parasites that damage the hides of livestock.

(f) Liver Fluke Investigations.--A survey of the fluke situation in 1912 indicated that the sheep liver fluke was prevalent along the Pacific Coast and the Gulf Coast, with extensions up certain river valleys to inland States. More recent surveys indicated that the fluke was spreading and was present in about 30 States, including many which were free from flukes in 1912. The damage to cattle livers alone has become an important item in connection with the increased value of livers in the treatment of pernicious anemia in man. In some sections of the United States a sizeable percentage of the lamb crop succumbs to liver-fluke infestation. Investigations are in progress to develop methods of controlling aquatic snails that serve as vectors for liver flukes.

(g) Internal Parasites of Ruminants.--Previous investigations have developed or standardized several treatments for stomach worms and other roundworms of sheep. The object of the project is to ascertain the basic facts in connection with cattle and sheep parasites and to develop treatments and control measures. Parasites cause more losses in sheep than do any other disease agents and in many places are the limiting factor in sheep production. A breeding disease of cattle, trichomonad infection, is known to produce an infection of the uterus, abortion, and sterility.

(h) Horse Parasite Investigations.--Horses in general are menageries of parasites, many of which are highly injurious because of their blood-sucking habits and are the cause of considerable losses. The object of the work under this project is to lay a foundation of scientific fact on which to build control measures and to make available to the people of the United States the data obtained so that losses may be reduced.

(i) Miscellaneous Parasite Investigations, including Parasites of Dogs, Cats, Wild Animals, etc.--Parasites of sheep, goats, and cattle are identical in many cases with parasites affecting deer and other wild ruminants, and some of our most important parasites of sheep and cattle have originated as parasites of wild ruminants in recent times. The same is true of parasites of domesticated and wild birds and other animals, and any competent study of parasites of domesticated animals must take cognizance of parasites of wild animals. A number of parasites of dogs are transmissible to man, and this fact gives the parasites of dogs special importance.

(j) Anthelmintics and Insecticides for the Destruction of Parasites.--The original object of this project was to establish the value of drugs in common use or at least recommended in the literature for the control of livestock parasites. This has been done. The next objective was to develop more effective drugs, and this has been done in some cases and is still being carried on effectively. A further objective is to ascertain basic correlations between the efficacy of a drug and its chemical composition and physical properties, and such investigations are now actively under way so that treatment for the removal of parasites can be established on a scientific rather than an empirical basis.

(k) Investigations on Trichinosis in Swine.--The available evidence indicates that nearly 20 percent of the population of this country acquire an infection with trichinae. While most of these infections are non-clinical, serious outbreaks, due to eating raw or imperfectly cooked pork, occur from time to time. The object of the work under this project is (a) to develop methods of devitalizing trichinae by refrigeration and curing, (b) to improve existing methods of processing designed to destroy trichinae, in keeping with new developments in the meat industry, and (c) to discover a test for diagnosing trichinosis in swine immediately before slaughter.

(e) ERADICATING TUBERCULOSIS AND BANG'S DISEASE

Appropriation Act, 1940	\$8,300,000 *
Budget Estimate, 1941	<u>5,320,180 *</u>
Decrease	<u>2,979,820 (a)</u>

* Together with \$4,000,000 of the unobligated balances of the funds made available by the Jones-Connally Act of May 25, 1934, and section 37 of the Act of August 24, 1935. (See Project Statement and explanation which follow.)

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase or decrease
1. Eradicating tuberculosis :	:	:	:	:
in livestock (including :	:	:	:	:
poultry)	\$2,342,439:	\$1,971,000:	\$1,971,000:	---
2. Combating Bang's disease :	:	:	:	:
in cattle	6,737,786:	6,229,000:	7,134,000:	+ \$905,000(1)
3. Experimentation in :	:	:	:	:
diseases of livestock.....	97,844:	100,000:	195,000:	+ 95,000(2)
Additional for administra- :	:	:	:	:
tive promotions	---	---	20,180:	+ 20,180(3)
Total obligated	9,178,069:	8,300,000:	9,320,180:	+1,020,180(a)
Unobligated balance	4,051,931:	---	---	---
Deduct: Unobligated balance:	:	:	:	:
of Jones-Connally and :	:	:	:	:
Section 37 funds, reap- :	:	:	:	:
propriated under this :	:	:	:	:
item	-7,827,000:	-4,000,000:	-4,000,000:	---
Add: 1940 unobligated bal- :	:	:	:	:
ance available for 1941...	---	+4,000,000:	---	-4,000,000
Total, regular :	:	:	:	:
appropriation	5,403,000:	8,300,000:	5,320,180:	-2,979,820(a)

INCREASES AND DECREASES

(a) While the estimates for 1941 provide for a decrease of \$2,979,820 in the regularly appropriated funds under this item, an increase of \$1,020,180 in working funds is provided for, taking into account the balances of "Jones-Connally" and "Section 37" funds approximating at present \$4,000,000 and proposed to be reappropriated for 1941. The actual increase in working funds for 1941 of \$1,020,180 is as follows:

(1) An increase of \$905,000 for cooperative work with the States in eradicating Bang's disease in cattle, to be used in matching State indemnity payments for the slaughter of cattle which react to the test for the disease. In Kentucky, Mississippi, and New Jersey, where no indemnity payments are now being made, the legislatures meet in January 1940. In Louisiana, Rhode Island, South Carolina, and Virginia, where indemnity payments in limited amounts are being made during the fiscal year 1940, the legislatures meet early in the year 1940. In New York, which is now doing considerable testing for Bang's disease, the legislature meets in January 1940. In California, Colorado, Indiana, Massachusetts, Missouri, Nevada, Oklahoma, South Dakota, and Texas, no indemnity payments are now being made. However, their legislatures will meet in January 1941. The legislatures of the remaining States, except Alabama which does not meet until 1943, convene early in 1941. It is also possible that one or more of the State legislatures will meet in special session. It is believed that increased Federal funds will be required to meet the extension of Bang's Disease control work likely to arise out of action taken by the States.

(2) An increase of \$95,000 for expanding the research work on Brucellosis of cattle (Bang's disease), particularly with regard to the preparation, development, and use of an effective biologic for immunizing calves against this disease. Results of the work conducted in this connection during recent years indicate that this field has possibilities toward the prevention of Bang's disease, especially if the immunizing agent is used when the animals are about 6 months of age. It is believed that much greater progress can be made in the control of Bang's disease in cattle if sufficient funds are made available so that the research work can be enlarged. Studies are being conducted at the Animal Disease Station, Beltsville, Maryland, and also in the various States in cooperation with the State agricultural colleges. These additional funds will be used in the employment of scientists and their assistants, the purchase of cattle, their care and feed, and the purchase of equipment. They will also be used in connection with the preparation of a larger quantity of the vaccines used in the study of vaccinations in privately owned herds maintained under field conditions.

(3) \$20,180 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

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Tuberculosis eradication has been in progress since 1917. Since 1934 both regular and special funds (Jones-Connally and Section 37, Act of August 24, 1935) have been used for this purpose. Bang's disease eradication was inaugurated in the fiscal year 1935 and this work, together with special experimental work on livestock diseases as authorized by Section 37 was financed exclusively with special funds through the fiscal year 1938. The 1939 Agricultural Appropriation Act provided for continuation of tuberculosis eradication, Bang's disease eradication, and special experimentation under one consolidated appropriation item entitled "Eradicating Tuberculosis and Bang's Disease," with a direct appropriation of \$5,403,000, together with the unexpended balance of

the special funds estimated at \$7,827,000, making in all \$13,230,000 of which approximately \$4,000,000 remained unobligated and was reappropriated for 1940.

The 1940 Agricultural Appropriation Act, under the item "Eradicating Tuberculosis and Bang's disease", appropriated \$8,300,000, together with the unexpended balance of the special funds estimated at \$4,000,000. Present indications are that \$8,300,000 (the amount of the regular appropriation) will be obligated during the fiscal year 1940, leaving unobligated the reappropriation of \$4,000,000 which will be available for reappropriation in 1941.

Table I, which follows, shows obligations of regular and special funds for the fiscal years 1934 through 1939; allotments, 1940; and the Budget Estimate, 1941.

Table II shows, by States and Territories, the allotments of funds for tuberculosis and Bang's disease work during the fiscal year 1940.

Table III shows the status of Jones-Connally and Section 37 funds, from which the unexpended balance will be available for 1941.

TABLE I

STATEMENT OF OBLIGATIONS AND ALLOTMENTS FOR ERADICATING TUBERCULOSIS, COMBATING BANG'S DISEASE, AND SPECIAL EXPERIMENTATION IN DISEASES OF LIVESTOCK, FISCAL YEARS 1934-1941.

Projects	Obliga- tions 1934	Obliga- tions 1935	Obliga- tions 1936	Obliga- tions 1937	Obliga- tions 1938	Obliga- tions 1939	Allotments 1940	Budget esti- mate 1941
<u>Eradicating Tuberculosis:</u>								
Regular Funds.....	3,877,293	1,966,490	1,636,817	1,429,514	1,558,956	1,603,000	1,971,000	1,971,000
Jones-Connally and Section 37....	- - -	9,500,000	5,961,671	2,720,962	1,775,000	739,439	- - -	- - -
Total, Eradicating Tuberculosis.....	3,877,293	11,466,490	7,598,488	4,150,476	3,333,956	2,342,439	1,971,000	1,971,000
<u>Combating Bang's Disease:</u>								
Regular Funds.....	- - -	- - -	- - -	- - -	- - -	3,800,000	6,229,000	3,154,180
Jones-Connally and Section 37....	- - -	10,687,175	14,345,116	13,481,908	11,653,062	2,937,786	- - -	4,000,000
Total, Combating Bang's Disease.....	- - -	10,687,175	14,345,116	13,481,908	11,653,062	6,737,786	6,229,000	7,154,180
<u>Experimentation in Diseases of Livestock:</u>								
Regular Funds.....	- - -	- - -	- - -	- - -	- - -	- - -	100,000	195,000
Section 37.....	- - -	- - -	13,297	106,130	129,938	97,844	- - -	- - -
Total, Regular and Special Funds.....	3,877,293	22,153,665	21,956,901	17,738,514	15,116,956	9,178,069	8,300,000	9,320,180

TABLE II

ERADICATING TUBERCULOSIS AND BANG'S DISEASE

1940 Allotments
(Combined funds)

State	Eradicating Tuberculosis		Combating Bang's Disease		Total
	Salaries and Expenses	Indemni- ties	Salaries and Expenses	Indemni- ties	
Eradicating tubercu- losis and combating Bang's disease:					
Alabama	\$ 13,000	- - -	\$ 110,000	\$ 100,000	\$ 223,000
Arizona	10,000	5,000	18,000	10,000	43,000
Arkansas	8,000	200	170,000	40,000	218,200
California	162,500	205,000	7,700	- - -	375,200
Colorado.....	7,000	2,000	36,800	- - -	45,800
Connecticut	16,000	10,000	18,000	15,000	59,000
Delaware	3,000	3,000	35,000	40,000	81,000
District of Columbia.	74,000	- - -	180,000	- - -	254,000
Florida	9,000	1,000	100,000	60,000	170,000
Georgia	15,000	100	95,000	25,000	135,100
Idaho	8,500	2,000	50,000	25,000	85,500
Illinois	23,407	38,000	41,133	125,000	227,540
Indiana	34,175	10,000	52,115	- - -	96,290
Iowa	41,761	75,000	113,169	128,000	357,930
Kansas	31,500	10,000	55,700	25,000	122,200
Kentucky	15,857	1,000	43,543	- - -	63,400
Louisiana	17,000	30,000	75,000	75,000	197,000
Maine	12,000	1,000	30,000	25,000	68,000
Maryland	26,000	15,000	60,000	100,000	201,000
Massachusetts	15,000	20,000	2,000	- - -	37,000
Michigan	24,714	7,000	141,286	100,000	273,000
Minnesota	24,250	25,000	196,250	175,000	420,500
Mississippi	30,000	5,000	40,000	- - -	75,000
Missouri	17,143	500	118,857	- - -	136,500
Montana	15,000	500	20,000	30,000	65,500
Nebraska	37,161	10,000	28,889	25,000	101,050
Nevada	10,000	500	10,000	- - -	20,500
New Hampshire	8,000	3,000	15,000	200,000	226,000
New Jersey	12,286	25,000	6,514	- - -	43,800
New Mexico	14,000	500	30,000	10,000	54,500
New York	46,786	80,000	23,214	200,000	350,000
North Carolina	8,000	500	55,000	50,000	113,500
North Dakota	35,000	6,000	30,000	40,000	111,000
Ohio	18,571	10,000	77,829	200,000	306,400
Oklahoma	15,764	6,200	31,376	- - -	53,340
Oregon	18,232	8,000	125,418	100,000	251,650
Pennsylvania.....	31,036	50,000	101,864	450,000	632,900

TABLE II - Continued

ERADICATING TUBERCULOSIS AND BANG'S DISEASE

1940 Allotments
(Combined Funds)

State	Eradicating Tuberculosis		Combating Bang's Disease		Total
	Salaries and Expenses	Indemni- ties	Salaries and Expenses	Indemni- ties	
Eradicating tubercu- losis and combating Bang's disease - Continued					
Rhode Island	\$ 8,000	\$ 4,000	\$ 3,000	\$ 1,000	\$ 16,000
South Carolina	6,000	500	40,000	1,000	47,500
South Dakota	60,536	10,000	30,964	- - -	101,500
Tennessee	20,000	1,000	60,000	50,000	131,000
Texas	35,928	2,000	41,672	- - -	79,600
Utah	10,000	5,000	35,000	30,000	80,000
Vermont	20,000	10,000	15,000	60,000	105,000
Virginia	22,000	7,000	110,000	100,000	239,000
Washington	25,136	15,000	125,244	150,000	315,380
West Virginia	12,000	1,000	40,000	20,000	73,000
Wisconsin	44,257	35,000	160,463	405,000	644,720
Wyoming	7,000	500	20,000	10,000	37,500
Alaska	- - -	- - -	- - -	- - -	- - -
Hawaii	1,500	1,000	- - -	- - -	2,500
Puerto Rico	24,000	8,000	- - -	- - -	32,000
Total	1,205,000	766,000	3,029,000	3,200,000	8,200,000
Eradicating tuberculosis and Bang's disease					8,200,000
Experimentation in diseases of livestock					<u>100,000</u>
GRAND TOTAL					8,300,000

TABLE III

STATEMENT SHOWING STATUS OF
\$150,000,000 JONES-CORNALLY FUNDS
AND \$10,000,000 MADE AVAILABLE BY
SECTION 37 OF ACT OF AUGUST 24, 1935

	<u>Amount</u>
<u>Obligated 1934-1939 and Allotments 1940:</u>	
Elimination of Diseased Cattle:	
Eradicating Tuberculosis.....	\$20,697,072
Combating Bang's Disease.....	53,105,047
Combating Mastitis.....	885,000
Experimentation in Diseases of	
Livestock.....	347,209
Total, Elimination of Diseased Cattle	<u>75,034,328</u>
Removal of Surpluses:	
Dairy Products.....	17,177,368
Cattle Purchases.....	63,736,373
Total, Removal of Surpluses.....	<u>80,913,741</u>
<u>Estimated for Reappropriation for 1941:</u>	
For Combating Bang's Disease.....	4,000,000
Uncommitted Balance.....	51,931
Total.....	<u><u>160,000,000</u></u>

WORK UNDER THIS APPROPRIATION

General-- The object of this work is to assist in a campaign to control and eradicate tuberculosis and Bang's disease among livestock in cooperation with the various States, Alaska, Hawaii, and Puerto Rico. The campaign for tuberculosis eradication has been in progress for about 21 years, and during the last 5 years there has been a considerable increase in the volume because of additional Federal funds being made available. The States and livestock owners desire the Federal Government to cooperate in this work and assume leadership in many instances, because it has been found that independent efforts sometimes failed. During the fiscal year ended June 30, 1939, approximately \$3,700,000 was expended by the cooperating States and counties for the payment of indemnities and operating expenses.

In 1934, funds were provided by authority of the Jones-Connally Act and augmented by Section 37 of the Act of August 24, 1935, to greatly expand the tuberculosis eradication work and to take up cooperative Bang's disease work among cattle. The foundation work for the elimination of Bang's disease had already been established to some extent because of action taken by the State livestock sanitary officials. The Department has for many years conducted research work in connection with this problem, and some work has also been done in the field in connection with the elimination of this disease in herds of cattle.

1. Eradicating Tuberculosis in Livestock (Including Poultry).-- Tuberculosis, when present, is an important disease of cattle, swine, and poultry because of its effect in reducing production and causing a loss of meat condemned as unfit for food. The cooperative tuberculosis eradication work conducted by this Department and the various State livestock sanitary authorities has been in operation since 1917, and there has been a marked reduction in the degree of infection in areas where the work has been performed.

During the first few years of the campaign the work was confined chiefly to the tuberculin testing of individual herds of cattle, either on a voluntary basis or under the rules and regulations in effect in the States in which the herds were located. This feature of the work was followed by what is known as the area plan, which consists of the tuberculin testing of all the cattle in a given area, such as a county. The reactors are removed for slaughter, and the premises previously occupied by them are thoroughly cleaned and disinfected. Retests of infected herds are conducted at proper intervals and, if the infection is found to be more than one percent, the entire cattle population is again tuberculin tested and the same procedure followed. This work is conducted under uniform rules and regulations established by the United States Livestock Sanitary Association and agreed to by the various State Livestock sanitary officials and this Bureau.

When the degree of infection among the cattle in a county is found to be less than one-half of one percent the county is declared to be a "modified tuberculosis-free accredited area." In July, 1923, the first counties in the United States were given that classification, and additional counties have been so classified each succeeding year. On July 1,

1939, 3,062 counties, or 99.7 percent of all the counties in the United States were in that status. All the counties in 47 States are now in the modified accredited area. In the 48th State--California--all but nine counties are in the modified accredited area. In the remaining nine counties the work is progressing, and it is expected that most of them will be classified as modified accredited areas in another year. All the municipalities in Puerto Rico and the entire Virgin Islands are also modified accredited areas. It is necessary to conduct a considerable amount of retesting of cattle in the modified accredited areas, which necessitates the employment of veterinarians in the field to perform the work. Part of the work is done by State and county veterinarians, and part by employees of this Bureau. Some work on this project is also conducted in Hawaii, in cooperation with the Territorial officials. Since the cooperative work was undertaken in 1917, approximately 3,711,000 reactors have been removed from the herds of cattle in this country. During the fiscal year 1939, tuberculin tests were applied to 11,186,805 cattle, disclosing 60,338 reactors, or 0.5 percent. On June 30, 1939, there were 262,972 fully accredited tuberculosis-free herds, containing approximately 3,830,000 cattle.

Tuberculosis among poultry is very prevalent in the Central and North Central States. This disease has been found to exist to a very high degree in some of the counties. It is caused by the avian type of bacilli, which is readily transmitted to swine. In swine it may progress to a point where it becomes generalized, but in most of the carcasses showing evidence of the disease on post-mortem examination, only slight lesions of the cervical or mesenteric lymph glands are found. Avian tuberculosis is particularly difficult to eradicate because of the fact that the organisms are so resistant. The bacilli will live for many months in the soil if protected by dirt or other material. It is quite a common practice, in many localities where the disease exists, for the poultry and swine to occupy the same premises during at least part of the day. This is a practice that will cause the disease to spread among swine. In combating avian tuberculosis, the veterinarians employed in the field cooperate with the local livestock sanitary officials and the owners of poultry flocks. Cooperation is also obtained from certain local organizations and the owners of hatcheries. During the fiscal year 1939 some work on this project was conducted on an intensive basis in selected townships. All of the poultry and swine in those townships were tuberculin tested, the reactors removed, and the premises disinfected as far as possible. This method has created considerable interest among the flock owners, and the plan will be continued. In some States a considerable amount of work has been done in connection with the tuberculin testing of flocks of poultry from which eggs are supplied to commercial hatcheries. In case reactors are found they are removed from the flock, and retests of the remaining fowls conducted at proper intervals.

One of the most important features in connection with the avian tuberculosis eradication project is to dispose of the older fowls, those that have completed their first laying period. This practice, in most instances, has been found a profitable one. Much information along this line is furnished the flock owners by veterinarians engaged in the tuberculin testing of cattle. This can be done with very little additional

expense due to the fact that the veterinarian can observe the flocks and discuss the subject with the owner while he is on the premises applying the tuberculin test to the cattle. During the fiscal year 1939 it was possible for these veterinarians to observe approximately 97,800 flocks, containing about 10,130,000 fowls, located in 10 States. About 12 veterinarians of the Bureau devoted practically all their time to the avian tuberculosis project. These veterinarians visited about 10,600 farms, observing approximately 1,367,000 fowls. Infection was reported on 1,776 farms. They also conducted a considerable amount of tuberculin testing of poultry and swine, and disseminated information regarding the disease in various ways.

Paratuberculosis, or Johne's disease, exists to some extent among cattle in the United States. This is a difficult disease on which to make a diagnosis. However, some herds were tested during the fiscal year 1939, and 321 reactors, or 9.0 percent, were removed.

This project also provides for the supervision of the disposition of bovine reactors to the tuberculin test which have been consigned to public stockyards for slaughter, and the supervision of the tuberculin testing at such stockyards of cattle to be shipped interstate for dairy or breeding purposes.

An important feature of the tuberculosis eradication work from the owners' standpoint is the payment of Federal indemnity for cattle which react to the tuberculin test and are slaughtered, as it enables such owners to purchase replacements and establish healthy herds. After the cattle have been found to react to the tuberculin test, they are appraised at their market value, taking into consideration their quality as breeding and dairy animals. They are marketed for slaughter by the owner, who receives the salvage. The Federal payment is limited to one-third of the difference between the appraised value of the animal and the salvage, not to exceed \$25 for grade animals or \$50 for registered purebred animals. Since July 1, 1938, Federal payment has been further limited to an amount not exceeding the total sum paid by the cooperating State. This limitation was in effect prior to the fiscal year 1935, at which time emergency funds, useable without regard to any State payment, became available for the payment of Federal indemnities. Payment from all sources, including the salvage, cannot exceed the appraised value. During the fiscal year 1939 the average appraisal was \$89.01; the average Federal payment \$15.97; the average State payment \$18.96; and the average salvage \$34.49. Of the total reactors for which Federal indemnity was paid, 5 percent were registered purebred cattle. The same provisions apply to the payment of Federal indemnity for animals slaughtered on account of Johne's disease. No indemnity is paid for steers or unregistered bulls.

2. Eradicating Bang's Disease in Cattle.-- Bang's disease among cattle, which is found in practically all sections of the United States, is a serious menace to the cattle industry. It is found to be much more prevalent in some localities than in others, the higher degree of infection being found in the larger herds of cattle where there has been a considerable exchange in the number of animals. It is also more prevalent in the larger milk-shed areas.

The elimination of the disease was taken up in a cooperative manner in July, 1934, with emergency funds, and arrangements made to test the cattle and make Federal payment to the owners for reactors slaughtered, in addition to the salvage obtained by the owners. There has been a very great demand for this work on the part of the cattle owners in many sections of the United States. During the fiscal year 1939, approximately 7,591,000 tests for this disease were applied to cattle, disclosing about 219,000 reactors, or 2.9 percent. Of these tests, a considerable number were retests applied at proper intervals.

This project is conducted on an individual herd basis, and is voluntary as far as the Federal Government is concerned. It is also conducted under what is known as the area plan in several States where the disease does not exist to a very high degree, and where the sentiment of the cattle owners is much in favor of conducting the work on that basis. When work is taken up under the area plan, all the cattle in the area, except steers and calves under 6 months of age, are tested and the reactors removed. This work is followed by the required amount of retesting. The owners are given instructions as to the proper sanitary methods to follow in order to eliminate the disease, as proper sanitation is a very important factor in its eradication.

At the close of the fiscal year 1939, approximately 1,372,000 herds, containing about 11,111,000 cattle, were under supervision throughout the United States. The work has developed much faster in some States than in others. In 7 States more than 50 percent of the breeding cattle over 6 months of age are under supervision, while in 13 States from 25 to 50 percent are in that status. In 15 States from 10 to 25 percent of the cattle are under supervision, and in the remaining 13 States less than 10 percent are under supervision. During the 5 years in which this work has been conducted, agglutination blood tests, including retests, have been applied to approximately 33,440,000 cattle, of which about 1,779,000 have been removed as reactors. Some work has been conducted in the field in connection with the vaccination of calves from 4 to 8 months of age against Bang's disease, following a plan that has proved quite successful under controlled conditions at the experiment stations. The owners of infected herds have furnished the necessary cooperation. Approximately 11,000 calves, located in about 260 herds, have been vaccinated, but the project is still considered to be in an experimental stage, and considerable more time will be required to properly evaluate the results. This project also provides for the supervision of the disposition of Bang's disease reacting cattle at public stockyards, to which they have been consigned for slaughter.

An extremely important feature of the project from the owners' standpoint is the payment of Federal indemnity for reactors slaughtered, as it enables such owners to purchase replacements and establish healthy herds. After the cattle have been found to react to the test for Bang's disease, they are appraised at their market value, taking into consideration their quality as breeding and dairy animals. They are then marketed for slaughter by the owners, who receive the salvage. Since July 1, 1938, the Federal payment has been limited to one-third of the difference between the appraised value of the animal and the salvage, but such payment cannot exceed \$25 for a grade animal or \$50 for a

registered purebred animal. The owner cannot receive from all sources, including the salvage, a sum greater than the appraised value of the animal.

For cattle slaughtered on or after May 1, 1939, the Federal payment has been further limited to an amount not exceeding the payment made by the cooperating State. Prior to May 1, 1939, only a few States made additional indemnity payments for animals slaughtered, but since that time funds have been provided in approximately 40 States for such State indemnity payments. During the fiscal year ended June 30, 1939, the average Federal payment was \$20.00. In addition to this, the owners received an average salvage of \$33.97. The average appraisal of cattle that reacted and were slaughtered was \$97.17. In States making indemnity payments, the average was \$26.09. Of the total reactors slaughtered, approximately 9 percent were registered purebred animals.

3. Experimentation in Diseases of Cattle.-- This activity was started in 1936 with funds authorized by Section 37 of the Act of August 24, 1935. Two alleged remedies for Bang's disease which have been widely advertised have been subjected to critical tests. Researches in connection with calfhood vaccination against Bang's disease and the transmission of infectious abortion to cattle by swine have yielded considerable information thus far, but a large amount of work remains to be done in connection with these researches as well as on other problems relating to Bang's disease, mastitis, anaplasmosis, warts, and nutritional deficiencies of cattle.

(f) ERADICATING CATTLE TICKS

Appropriation Act, 1940	\$475,000
Budget Estimate, 1941	340,670
Decrease	<u>134,330</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase or decrease
Eradicating cattle ticks ..!	\$471,615	\$475,000	\$340,000	-\$135,000(1)
Additional for administra- tive promotions	- - -	- - -	670	+ 670(2)
Unobligated balance	32,325	- - -	- - -	- - -
Total	503,940	475,000	340,670	- 134,330

INCREASE OR DECREASE

The decrease of \$134,330 in this item for 1941 consists of:

(1) A reduction of \$135,000 for tick-eradication work, which will be met by decreasing the number of temporary agents assigned thereto. The curtailment in the work will be chiefly in Florida, Louisiana, and Texas.

(2) \$670 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

This appropriation is used cooperatively for the payment of salaries and travel and office expenses of veterinarians and agents in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, and Texas, and the territory of Puerto Rico and Virgin Islands, in the eradication of cattle fever tick, which spreads splenic fever infection among cattle. As counties are freed of this tick they are released from Federal quarantine, and their livestock may then be shipped to markets without restrictions. The States contribute large sums to this work. The work is conducted under State laws and regulations, Federal money being expended for supervision, thus insuring that all measures of eradication be so carried out as to warrant the release of areas from quarantine.

(g) HOG CHOLERA CONTROL

Appropriation Act, 1940	\$122,000
Budget Estimate, 1941	113,148
Decrease	<u>8,852</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase or decrease
Hog cholera control	\$116,558	\$122,000	\$112,728	-\$9,272(1)
Additional for administrative promotions	- - -	- - -	420	+ 420(2)
Unobligated balance	5,442	- - -	- - -	- - -
Total	122,000	122,000	113,148	- 8,852

INCREASE OR DECREASE

The decrease of \$8,852 in this item for 1941 consists of:

(1) A reduction of \$9,272 for hog-cholera control, which will be met by reducing, by the equivalent of 3 full-time veterinarians, the veterinary service rendered the several States cooperating in swine disease control work.

(2) \$420 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

Under this appropriation work is carried on in the control and eradication of hog cholera in the field by demonstrations, the formation of organizations, and other methods either independently or in cooperation with farmers' organizations and State and county authorities. Meetings are held and demonstrations are made from time to time to gatherings of farmers and others interested in preventing losses. Outbreaks are investigated, swine diseases diagnosed, owners are instructed in methods to prevent losses, and local veterinary practitioners are assisted in the use of the preventive treatment and in diagnosing swine ailments. In sections of the South where no veterinary services are available, Bureau inspectors immunize swine in addition to their other duties, and in States where the laws and regulations permit, laymen are trained to immunize swine.

(h) INSPECTION AND QUARANTINE

Appropriation Act, 1940	\$680,000
Budget Estimate, 1941	609,410
Decrease	<u>70,590</u>

PROJECT STATEMENT

Projects	1939	1940 :(Estimated):	1941 :(Estimated):	Increase or decrease
1. Scabies eradication ...	\$147,165	\$161,150	\$135,150	-\$26,000(1)
2. Control over interstate shipment of livestock for the purpose of pre- venting the spread of communicable diseases..	299,112	305,205	273,705	- 31,500(2)
3. Enforcement of the 28- hour law	28,226	29,795	25,795	- 4,000(3)
4. Determination by inspec- tors in the field of the existence of diseases .	22,797	20,930	15,930	- 5,000(4)
5. Inspection and quaran- tine of import animals	94,915	89,920	89,920	- - -
6. Supervision over the im- portation of hides, and other animal by-products, forage, etc.	65,182	68,000	59,000	- 9,000(5)
7. Inspection and testing of animals for export .	3,616	5,000	4,000	- 1,000(6)
Additional for administra- tive promotions	- - -	- - -	5,910	+ 5,910(7)
Unobligated balance	18,987	- - -	- - -	- - -
Total appropriation ..	680,000	680,000	609,410	- 70,590

INCREASES OR DECREASES

The decrease of \$70,590 in this item consists of:

(1) A reduction of \$26,000 in the allotment for "Scabies eradication," to be effected through reduction of field personnel, and traveling and miscellaneous expenses incidental thereto, in the western range areas, where substantial progress has been made toward completion of the work. The reduction will preclude undertaking cooperative work in additional areas.

(2) A reduction of \$31,500 in the allotment for "Control of interstate shipments of livestock for the purpose of preventing the spread of communicable diseases," to be met by a curtailment in the personnel at public stockyards engaged in the inspection and treatment of livestock moving in interstate commerce.

(3) A reduction of \$4,000 in the allotment for "Enforcement of the 28-Hour Law," to be effected by reducing the personnel and travel expenses of employees engaged in the enforcement of this law.

(4) A reduction of \$5,000 in the allotment for "Determination by inspectors in the field of the existence of diseases," to be effected through curtailing the assignment of Bureau employees to cooperate with State officials in handling outbreaks of various communicable diseases.

(5) A reduction of \$9,000 in the allotment for "Supervision over the importation of hides and other animal by products," which will be met by a curtailment of personnel, a part of which, it is anticipated, will result from the revision of the governing regulations effective February 1, 1940. In addition, it will be necessary to reduce the supervision exercised over various establishments handling restricted products.

(6) A reduction of \$1,000 in the allotment for "Inspection and testing of animals for export," to be effected through reducing the amount of time devoted by employees to the inspection and testing of animals and inspection of vessels.

(7) \$5,910 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--Activities under this appropriation include eradication of scabies and dourine in cooperation with the various States; the investigation of reported outbreaks of diseases among livestock to determine if they are communicable and, if so, assisting local authorities in their control and eradication; the application of diagnostic tests in the field and in the laboratory; control over interstate movements of livestock in order to prevent the dissemination of infections, which includes inspection at the principal market centers; administration of the 28-hour law to prevent cruelty to animals in interstate transportation; inspection and testing of livestock intended for export, to determine their freedom from disease, and the inspection of vessels on which they are to be transported; the inspection and quarantine of livestock offered for importation; control over import animal by-products, hay and straw, to prevent the introduction or dissemination of the contagions of livestock diseases; and the administration, jointly with the Treasury Department, of Section 306 of the Tariff Act of 1930, prohibiting the importation of domestic ruminants or swine, or chilled or frozen fresh meats derived therefrom, from countries where foot-and-mouth disease or rinderpest exists.

1. Scabies Eradication.--The purpose of the project is the complete eradication of scabies or mange, a highly contagious skin disease of sheep and cattle which, if unchecked, causes great financial losses. Eradication work is carried on in cooperation with the States involved under written agreements with State authorities. It consists of inspecting all sheep or cattle, as the case may be, in areas where scabies exists, or has existed recently, and causing all animals found to be infected or exposed to be dipped under the supervision of Federal or State employees. Further inspections on the ranges or premises are then made in order that any infection that may have escaped may be promptly discovered and the animals properly treated. Quarantine of premises or specified areas where infection has been determined to exist are applied by State authorities in order to control movements of livestock until the required treatments have been accomplished, and, when necessary to prevent the spread of the disease to other States, Federal quarantine also is imposed. Inspections of cattle and sheep in the areas involved are continued for several seasons following the cleanup campaign to insure against the existence of obscure centers of infection.

2. Control over Interstate Shipment of Livestock for the Purpose of Preventing the Spread of Communicable Disease.--The purpose of this project is to detect communicable diseases of livestock at public stockyards and to treat the animals and premises and the transporting vehicles in such a manner as to minimize the danger of spreading such diseases; to furnish information to livestock sanitary officials to assist them in eradicating the disease at point of origin; to supervise the application of tests used to detect communicable diseases in animals shipped from the stockyards to country points and to protect animals so shipped against such diseases. The discovery at public stockyards of shipments of livestock affected with communicable diseases is a very important factor in tracing infection back to its source. In a great many instances the discovery at public markets is the first knowledge gained of the existence of infectious disease in the district of origin. Notice is sent by Federal employees to State or local authorities, enabling them to take steps promptly to localize and eradicate outbreaks which would, otherwise, become widespread before information concerning them would reach the authorities. This project also covers the enforcement of the animal quarantine laws prohibiting the interstate movement of animals affected with or exposed to contagious, infectious, or communicable diseases.

3. Enforcement of the 28-Hour Law.--The 28-hour law is designed to lessen cruelty to animals while in the course of inter-state transportation by preventing carriers from confining livestock for a period exceeding 28 consecutive hours without unloading in a humane manner into properly equipped pens for feed, water, and rest for at least 5 consecutive hours, except in cases where the confinement may be extended to 36 hours upon written request of the shipper.

4. Determination by Inspectors in the Field of the Existence of Diseases.--Under this project the Bureau assists State authorities in investigating diseases among livestock that appear to be communicable and in control and eradication work when such diseases are found to exist. Most prominent among these are dourine and encephalomyelitis of horses, and anthrax. The procedure depends upon the particular disease found to exist. Inspectors in the field cooperate in making diagnoses, which in some cases includes drawing blood for forwarding to the laboratory for test, in arranging for the treatment or the destruction of animals affected, and in disseminating information among owners concerning measures to be taken. All reports of suspected cases of foot-and-mouth disease are carefully investigated.

5. Inspection and Quarantine of Import Animals.--The law requires that inspections be made of all livestock offered for importation. Accordingly, inspectors are assigned to stations along the international boundaries and on the seacoasts to inspect animals, examine accompanying certificates, and when necessary place the livestock in quarantine and maintain them under observation during specified periods. Animals in quarantine are subjected to certain diagnostic tests. Those found to be affected with or to have been exposed to any communicable disease are refused entry and are returned to the country of origin or destroyed. Vessels having on board live animals as sea stores, originating in countries where foot-and-mouth disease or rinderpest exists, are not permitted to dock until the animals have been slaughtered and the spaces occupied by them disinfected under supervision.

6. Supervision over the Importation of Hides and Other Animal By-products, Forage, etc.--Several serious diseases of livestock, such as foot-and-mouth disease, rinderpest, surra, and contagious pleuropneumonia, from which the United States is entirely free, exists in many countries with which we have active trade relations. In order to prevent the introduction of these diseases through the medium of imported materials, supervision and control are exercised over animal by-products, hay, straw, etc., offered for entry. All such products are held by Customs for action by Bureau inspectors who indicate whether they may be released or must be subjected to quarantine or destruction, or may proceed to approved establishments where they are disinfected in process of manufacture. A most important duty is to prevent the landing of any chilled or frozen fresh meats, whether sea stores or cargo, originating in countries where foot-and-mouth disease or rinderpest exists, which are prohibited entry under the tariff law. Measures are also taken to prevent the landing of garbage derived from such meats.

7. Inspection and Testing of Animals for Export.--The law provides that freedom from disease of domestic ruminants and swine intended for export must be established and that vessels on which they are to be transported must be so equipped as to insure the safe and humane handling of the animals. Inspectors in the field and at ports of embarkation make the necessary inspections, apply diagnostic tests, and take measures to comply with any additional requirements of the receiving countries. Space and facilities on the vessels are inspected and must be approved before embarkation is permitted.

(i) MEAT INSPECTION

Appropriation Act, 1940	\$5,433,000
Budget Estimate, 1941	5,507,160
Increase	<u>74,160</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. Meat inspection operations at packing plants under the Federal Meat Inspection service	\$5,255,510	\$5,237,305	\$5,237,305	- - -
2. Determination of adulterations and other objectionable conditions in meat and meat food products by laboratory analysis	84,225	88,600	88,600	- - -
3. Inspection of imported meats and meat food products	31,094	29,775	29,775	- - -
4. Chemical, pathological and zoological investigations relating to meat inspection	30,907	27,320	27,320	- - -
Additional for administrative promotions	- - -	- - -	74,160	+\$74,160(1)
Unobligated balance	10,864	- - -	- - -	- - -
Total appropriation ..	5,412,600	5,433,000	5,507,160	+ 74,160

INCREASE

(1) The increase of \$75,160 above represents the additional amount estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--The purpose of Federal meat inspection is to prevent, through the enforcement of the Meat Inspection Acts, the use in interstate or foreign commerce of meat and meat food products which are unsound, unhealthful, unwholesome, or otherwise unfit for human food. The principal meat inspection operations at meat packing establishments include ante-mortem and post-mortem inspections of cattle, sheep, swine, goats, and, to a limited degree, of horses; reinspection of meat and meat products during processing, preparation, and packing, and the

supervision of marking and branding of products to insure truthful labeling. In addition, the service includes inspection under the Import Meat Act and Meat Inspection Acts of imported meat and meat products; also laboratory examinations as assurance against adulterations or similarly objectionable conditions, and to determine the character and importance of abnormal conditions in food animals encountered in ante-mortem and post-mortem inspections of their carcasses, and subsequent inspections of meat and meat food products derived therefrom.

1. Meat Inspection Operations at Packing Plants Under the Federal Meat Inspection Service.--The purpose of this project is to see that the laws and regulations governing meat inspection are properly observed. The inspection includes ante-mortem and post-mortem examinations of cattle, sheep, swine, goats, and horses to detect disease or conditions which render any of the meat or organs unfit for food purposes; enforcement of sanitary requirements; reinspection of meat and products throughout the stages of the processing, preparing, and packing operations, and the inspection of ingredients, spices, and other substances added to meat and meat food products; custody, including supervision of the destruction for food purposes, of all condemned animals, carcasses, parts thereof, and meat food products; supervision of the labeling and marking of meat and meat food products, and investigation of the interstate transportation by common carrier and otherwise to ascertain compliance with the law as to eligibility of the product for interstate shipment and proper certification.

2. Determination of Adulterations and Other Objectionable Conditions in Meat and Meat Food Products by Laboratory Analysis.--The purpose of this project is to ascertain by laboratory analysis whether meat and meat food products which are prepared at official establishments or at plants operated under certificates of exemption and imported meat and meat food products are adulterated or contain prohibited or otherwise objectionable materials and whether water and ice used in the preparation of meat and meat food products are clean and potable; also to determine the fitness of curing agents, ingredients, spices, and other substances intended for use in preparing meat and meat food products, and to ascertain the efficacy of materials used for denaturing of inedible and condemned articles.

3. Inspection of Imported Meats and Meat Food Products.--The purpose of this project is to see that only meat and meat food products are accepted for importation which have been properly certified from abroad, are sound, healthful, wholesome, and otherwise fit for food, and are truthfully labeled.

4. Chemical, Pathological and Zoological Investigations Relating to Meat Inspection.--The principal purpose of this project is to conduct research and investigations for the scientific determination of character and importance of abnormal conditions encountered in ante-mortem, post-mortem, and subsequent inspections of food animals and meat and meat food products.

5. Meat Inspection Operations for Other Government Agencies.-- The services of employees in meat inspection, located at approximately 250 cities and towns throughout the United States, are used as required in inspection and examination of meats and other food products offered for delivery under various specifications by contractors to other Government agencies. During the fiscal year 1939 thirteen Government agencies availed themselves of this service and reimbursed the Department of Agriculture in amounts equal to the cost of the service.

(j) VIRUS-SERUM-TOXIN ACT

Appropriation Act, 1940	\$218,712
Budget Estimate, 1941	220,692
Increase	<u>1,980</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
Control of manufacture, importation and ship- ment of viruses, serums, toxins, etc. ...	\$213,004	\$213,712	\$218,712	- - -
Additional for administra- tive promotions	- - -	- - -	1,980	+ \$1,980(1)
Unobligated balance	5,708	- - -	- - -	- - -
Total	218,712	218,712	220,692	+ 1,980

INCREASE

(1) The increase of \$1,980 above the additional amount estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

This item provides for the enforcement of the provisions of the Virus-Serum-Toxin Act, approved March 4, 1913, regulating the preparation, sale, barter, exchange, or shipment of viruses, serums, toxins, or analogous products produced in the United States and the importation of such products intended for use in the treatment of domestic animals. Careful attention is given to sanitation, labeling, and the testing of the finished products for purity and potency.

Establishments desiring to produce veterinary biologics for interstate shipment are required by law to hold a United States Veterinary License. The holders of such licenses must at all times comply with the regulations of the Secretary of Agriculture as to personnel, construction of plant, methods of production, and the like.

The regulations issued by the Secretary also govern the importation of veterinary biologics from foreign countries and on March 15, 1939, these were amended to include control of importation of organisms or vectors that may introduce or disseminate contagious or infectious diseases to animals in this country. Bureau inspectors directly supervise all operations performed by licensed establishments in the production of anti-hog-cholera serum and hog-cholera virus. Establishments producing other biologics are inspected periodically.

(k) MARKETING AGREEMENTS WITH RESPECT TO HOG-
CHOLERA VIRUS AND SERUM

Appropriation Act, 1940	\$30,000 (a)
Budget Estimate, 1941	<u>30,000 (a)</u>

(a) Transferred and payable from the unobligated balance of the appropriation provided by Section 12 (a), Title I, of the Agricultural Adjustment Act of May 12, 1933.

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)
Marketing agreements with respect to hog-cholera virus and serum	(a) \$29,510	\$30,000	\$30,000
Received by transfer from "Salaries and Expenses, Agricultural Adjustment Administration"	-29,510	-30,000	-30,000
Total	- - -	- - -	- - -

(a) Unobligated portion of allotment (\$490 out of total allotment of \$30,000) returned to "Salaries and Expenses, Agricultural Adjustment Administration."

WORK UNDER THIS APPROPRIATION

This item provides funds for the enforcement of sections 56 to 60, inclusive, of the Act approved August 24, 1935 (7 U.S.C. 851-855), entitled "An Act to amend the Agricultural Adjustment Act and for other purposes." Such marketing agreements are intended to insure the maintenance of an adequate supply of anti-hog-cholera serum and hog-cholera virus for hog producers and to aid in making other improvements in trade conditions. The Department exercises supervision over agencies that may be established under the provisions of such agreements, receives reports of their activities, and reviews their acts, orders, etc.

(1) ERADICATION OF FOOT-AND-MOUTH AND
OTHER CONTAGIOUS DISEASES OF ANIMALS

This item continues the availability of the unexpended balance (\$1,317,918) of the appropriation of \$3,500,000 made in 1924 to be used in case of an emergency arising from an outbreak of foot-and-mouth or other contagious diseases of animals. It provides also that \$5,000 of this balance may, if needed, be used for the control of European fowl pest and similar diseases in poultry. No expenditures are contemplated during the fiscal year 1940 unless an emergency arises, but the availability of this fund is absolutely essential to insure immediate protection of the American livestock industry should outbreaks occur.

SUPPLEMENTAL FUNDS

				*
Projects	:	:	:	
	:	:	:	
	: Obligated,	: Estimated	: Estimated	
	: 1939	: 1940	: 1941	
Special Research Fund, Department of:	:	:	:	
Agriculture:	:	:	:	
Special research projects	: \$ 69,568	: \$ 93,096	: \$ 92,360	
Special research laboratories in	:	:	:	
major agricultural regions	: 264,189	: 265,000	: 265,000	
Total - Special Research Funds	: 333,757	: 358,096	: 357,360	
Agricultural Adjustment Adminis-	:	:	:	
tration (Salaries and Expenses):	:	:	:	
Marketing agreements, hog-cholera:	:	:	:	
virus and serum	: 29,510	: 30,000	: 30,000	
Total, Supplemental Funds	: 363,267	: 388,096	: 387,360	

PASSENGER-CARRYING VEHICLES

The authorization for the purchase of passenger-carrying vehicles for the Bureau of Animal Industry contemplates an increase of \$31,750 (\$100,000 in 1940; \$131,750 for 1941) in order to permit the Bureau to replace 261 old vehicles at an average cost of \$505 each after exchange allowances are deducted. This is less than one-third of the Bureau's cars. Nearly 95 per cent of its passenger-carrying vehicles are used in inspectional work on farms in the rural districts any many of them have mileage of 18,000 and upward a year. It has been the Bureau's experience that cars assigned to rural inspectional work receive such rough use on secondary and county roads and lanes leading to farms that they must be replaced, on an average, at least every 3 years in order to keep mileage charges at the lowest possible point and to prevent frequent interruptions to the work which occur due to breakdowns when badly worn equipment is kept in service. All the cars to be replaced have reached the point where they can no longer be operated economically, the average mileage being over 40,000 and individual cases running as high as 60,000.

The Bureau is unable to carry on economically and efficiently its varied activities in the field by the use of public transportation. Therefore, when Government-owned cars are not available it is necessary to authorize employees to operate their personally owned cars on a mileage basis. The Bureau is now operating 792 passenger-carrying vehicles in the field and has found that this method of transporting its employees is considerably less expensive than when it reimburses them for the use of their own cars. The Bureau has found that, figuring on purchase price and operation charges, less trade-in allowance, Government-owned passenger-carrying cars can be operated in almost every section of the country for approximately 3 cents a mile.

BUREAU OF DAIRY INDUSTRY

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation Act, 1940	\$75,500
Budget Estimate, 1941.....	<u>76,340</u>
Increase.....	<u>840</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
General administration and business service.....	\$75,466	\$75,500	\$75,500	---
Unobligated balance.....	34	---	---	
Additional for administra- tive promotions.....	---	---	840	+ \$840 (1)
Total appropriation...	75,500	75,500	76,340	+ 840

INCREASE

(1) \$840 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

The work conducted under this appropriation includes the direction of the research and service activities of the Bureau of Dairy Industry, the administration of the business activities, general supervision of personnel, administrative review of publications and other material for disseminating the results of research work, and compilation of bibliographies of dairy literature and related library work.

(b) DAIRY INVESTIGATIONS

Appropriation Act, 1940.....	\$645,905
Budget Estimate, 1941.....	<u>686,005</u>
Increase.....	<u>40,100</u>

PROJECT STATEMENT

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. Investigations of milk and butterfat production of dairy cows:				
(a) Investigations of inheritance of milk and butterfat production.....	\$176,126	\$172,460	\$179,960	+\$7,500 (1-a)
(b) Investigations of influence of feeding and management on level and cost of milk production and growth	72,152	74,255	76,935	+ 2,680 (1-b)
(c) Investigations of relation of conformation to producing ability.....	15,212	14,366	14,366	---
(d) Investigations of the nutritional and other physiological factors affecting the usefulness of dairy cows.....	79,830	83,673	83,673	---
(e) Studies of dairy-herd-improvement association records to determine the effect of the application of breeding and feeding practices on level and economy of production.....	99,263	94,961	122,561	+ 27,600 (1-c)
Total, Investigations of milk and butterfat production of dairy cows..	442,583	439,715	477,495	+ 37,780 (1)
2. Market-milk investigations:				
(a) Dairy sanitation research.....	10,987	11,800	11,800	---
(b) Milk-plant management investigations..	7,325	7,870	7,870	---
(c) Milk quality improvement investigations.....	11,448	12,030	12,030	---
Total, Market-milk investigations.....	29,760	31,700	31,700	---

PROJECT STATEMENT - Continued

Project	1939	1940 (Estimated)	1941 (Estimated)	Increase
3. Investigations of the utilization of milk in the manufacture of milk products:				
(a) Basic investigations of the bacteriology and chemistry of milk.....	\$16,028	\$16,350	\$16,350	---
(b) General investigations of ice cream manufacture.....	16,868	18,165	18,165	---
(c) General investigations of the manufacture of butter and byproducts	43,635	46,590	46,590	---
(d) Condensed, evaporated and dried milk investigations.....	18,082	22,450	22,450	---
(e) General investigations of cheese manufacture.....	29,477	33,780	33,780	---
(f) State and industry relations for milk products manufacture..	30,341	30,155	30,155	---
(g) Enforcement of renovated butter act (regulatory).....	6,807	7,000	7,000	---
Total, Investigations of the utilization of milk in the manufacture of milk products.....	161,238(a)	174,490	174,490	---
Total obligated.....	633,581	645,905	683,685	+ \$37,780
Unobligated balance.....	8,324	---	---	---
Additional for administrative promotions.....	---	---	2,320	+ 2,320 (2)
Total appropriation.	641,905	645,905	686,005	+ 40,100

INCREASES

(1) The increase of \$40,100 in this item for 1941 consists of:

(a) An increase of \$7,500 for investigations of inheritance of milk and butterfat production, including --

An increase of \$2,500 is to enable the Bureau of Dairy Industry to give greater emphasis to fundamental research in artificial insemination of dairy cattle. There is probably no one subject in the animal husbandry field that is creating more interest at present than that of artificial insemination of dairy cows. The work conducted by the Bureau of Dairy Industry during the past 3 or 4 years has attracted wide attention. Investigations should be made of the conditions under which sperm cells may be transported considerable distances without loss of viability. The veterinarian now employed by the Bureau has little time to devote to research work due to the fact that he has so much detail and routine work to perform in connection with the veterinary care of the herds. The employment of a junior veterinarian (\$2,000) will relieve the veterinarian of a considerable amount of routine work and permit him to devote a portion of his time to the prosecution of research work on artificial insemination. An increase of \$500 is also included for the purchase of supplies and material essential to the work.

An increase of \$5,000 is for the employment of clerical and other personnel at the National Agricultural Research Center. The personnel of the dairy station at Beltsville is entirely inadequate for properly handling the clerical work. The clerical personnel is limited at present to 3 employees and 2 projects are without any clerical assistance whatever. The scientific personnel regularly assigned for duty at the National Agricultural Research Center consists of 21 employees. These employees obviously have a considerable amount of correspondence and a very large volume of work in the form of manuscripts for bulletins, scientific journals, etc. In addition, each project has a considerable amount of administrative work to perform. Under present conditions the scientific personnel is required to do work which properly should be performed by clerks. Such a requirement interferes with the efficient conduct of research and is distinctly uneconomical. This increase would provide in part for the employment of one clerk at \$1,260.

Due to the inauguration of the 44-hour week, the extension of additional leave privileges, and the necessity for segregating a large number of animals affected with tuberculosis and contagious abortion (Bang's disease), the number of men required to feed, milk, and otherwise care for the animals is constantly increasing. The animals must be fed and cared for every day in the week. There is a loss of 78 days per man per year due to the 5 1/2 day week, which, together with a further loss of 33 days due to annual leave and statutory holidays, necessitates the services of 1/2 of a man as a substitute for each employee where work of this type is involved. In other words, for every 2 men regularly employed, one additional man must also be employed as a substitute for Saturday half-holidays, Sundays, legal holidays, and during periods of

annual and sick leave. While this situation has persisted for some time, the Bureau was able to meet it because of the decrease in the herds due to losses through disease. But the number of animals has again reached normal and because of the conditions as indicated above the personnel is inadequate. Four dairy-barn attendants at \$1,200 each are provided for, as is one assistant herdsman at \$1,620. (See also note 1-b.)

(b) An increase of \$2,680 for investigations of influence of feeding and management on level and cost of milk production and growth.

This increase is for the employment of clerical and other personnel at the National Agricultural Research Center. (See preceding note.)

(c) An increase of \$27,600 for studies of dairy-herd-improvement-association records to determine the effect of the application of breeding and feeding practices on level and economy of production. The dairy-herd-improvement-association program, with its nation-wide sire-proving project, has grown until it is now larger and broader in scope than at any previous time. More than 625,000 cows are now being tested. These cows are in the herds of approximately 26,000 dairymen who are members of local dairy-herd-improvement associations. These dairymen pay a total of more than \$1,000,000 each year in support of their local associations. During the past 10 years the association members have improved the producing efficiency of their dairy herds to the extent that the average production of their cows is now approximately 30 pounds of butterfat more than it was a decade ago. This increased producing efficiency has resulted in an increased income for association members of approximately \$8,000,000 each year.

The nationwide sire-proving program, conducted as a part of the dairy-herd-improvement-association project, was inaugurated in 1937 and is the broadest and most comprehensive dairy-cattle breeding program ever undertaken in this or in any other country. Under this program complete data are obtained on approximately 26,000 dairy herds and analyzed to show the genetic make-up of each herd for the purpose of identifying those animals and families of animals that possess the ability to transmit high milk and butterfat producing ability to their offspring. It is the purpose of the program to disseminate the influence of these superior association herds, which have an average butterfat production of 317 pounds per cow, throughout the national dairy herd of 25,000,000 cows, which has an average butterfat production of only 170 pounds per cow. Data are being obtained on every sire used in every association herd. Large numbers of superior sires are being identified annually.

The program in full operation will afford all dairymen, for the first time, an opportunity to obtain the services of sires known to have the ability to transmit an inheritance for high milk and butterfat production. The producing efficiency of dairy herds generally may then be consistently and systematically improved. Only

good replacement stock will be produced. This will greatly reduce the tremendous losses dairymen now suffer from the raising of poor replacements that must be discarded as soon as their inferiority is established.

The program, with its nationwide sire-proving project, has been enthusiastically received and adopted by dairymen in all sections of the country. As possibilities of the program have become generally recognized the membership in local associations has increased more than 9,000, with the result that more than 220,000 additional cows have been placed on test during the past 3 years.

This program, as stated above, was started as a part of the general dairy-herd-improvement-association project in the fiscal year 1937, at which time \$35,000 was appropriated to support it by providing for a central permanent record system, necessary personnel, and research facilities in the Bureau of Dairy Industry to handle the data obtained through local associations. This appropriation was supplemented during the fiscal year 1939 with an appropriation of \$6,210. Additional funds are necessary to properly support this program which is being conducted in all sections of the country and is recognized as the most effective dairy-cattle-improvement program yet inaugurated. The increase recommended is to provide \$14,400 for the employment of 10 clerks at \$1,440 each, and \$13,200 for the purchase of equipment.

(2) \$2,320 additional for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--The work conducted under this appropriation by the Bureau of Dairy Industry embraces scientific research and experimentation in the various problems of milk production and utilization, including studies in the breeding, feeding, and management of dairy cattle; nutritional and physiological factors affecting milk secretion and the health of animals, with special reference to reproduction; investigations of the efficiency and economy of milk production through the operation of dairy-herd-improvement associations; studies of problems relating to the sanitary production, transportation, processing, and distribution of market milk and cream; basic investigations of the bacteriology and chemistry of milk; investigations of the effective utilization of milk byproducts to develop new uses for such byproducts; and studies of methods of manufacturing milk products and byproducts, including improvement in existing methods of manufacture. The Bureau is also charged with the enforcement of the law relating to the manufacture of renovated or process butter and the sanitary inspection of renovated-butter factories.

1. Investigations of Milk and Butterfat Production of Dairy Cows.

Under this project investigations are conducted in the breeding, feeding, and management of dairy cattle, including investigations of the nutritional and physiological factors affecting milk secretion and reproduction. The investigations are conducted by the Bureau of Dairy Industry through its Divisions of Dairy Cattle Breeding, Feeding, and Management; Dairy-Herd-Improvement Investigations; and Nutrition and Physiology under the following projects:

(a) Investigations of Inheritance of Milk and Butterfat Production.--These investigations have for their object a determination of the comparative effects of different methods of breeding in fixing an inheritance for high and uniform levels of producing ability in dairy cows. Among these methods of breeding is a test of the possibilities of breeding strains of cattle which will be pure in their inheritance for high levels of production, as a result of the continued use of sires that have demonstrated they possess the hereditary factors that enable them to transmit high levels of production to all of their offspring. The need for investigational work in the breeding of animals for consistently high production is emphasized by the fact that of all cows in dairy-herd-improvement associations only about one-third of them produce enough to be profitable to their owners. The other two-thirds either show no profit at all or are being kept at a loss. Data from 25 States show that about 38.6 percent of the cows discarded were eliminated because of low production. Since less than 2 percent of the total cow population of the country is in dairy-herd-improvement associations, and these, together with cows being tested through the breed associations, are higher producers, on the average, than the average dairy cow, it is probably safe to say that considerably less than one-third of all of our dairy cows are profitable to their owners.

In the nationwide germ-plasm survey of dairy cattle, the results of which were published in the 1936 Yearbook of the Department of Agriculture, it was shown that in approximately 1,100 herds representative of the better class of dairy cattle in the country, no improvement in producing ability, on the average, has been achieved. In 708 of these herds, 4,309 sires had been used, and of those sires on which sufficient data were available to evaluate their transmitting ability only about one-half had been able to increase the production of their daughters over that of the dams of the daughters, though these sires had been selected by men who were perhaps the best informed in such matters in the industry.

Eighty-nine Jersey cows sired by bulls of proven transmitting ability, bred in the experimental breeding herd at the Beltsville Station and tested under uniform conditions, have made an average mature yield of 680 pounds of butterfat. Ninety-eight Holstein cows have been sired at this station by sires of known transmitting ability, and their average production on a mature basis was 705 pounds of butterfat. Only 16 of the 98 cows made records of less than 600 pounds of butterfat. The lowest producer of the 173 cows of both breeds had a record of 253 pounds of butterfat, and this low production

is believed to be due to extensive abscesses which were found on post-mortem examination. A number of cows that did not produce up to expectations were found to have abnormal pituitaries.

The above results would seem to indicate that the system of using selected sires on the basis of their known ability to increase production is successful in fixing an inheritance in which the factors for high-producing ability predominate. The only apparent weakness of the superior proved-sire system of breeding is the scarcity of superior proved sires. Theoretically, however, once the inheritance for the factors determining a high level of production is purified in a given herd or strain, the male offspring should possess this inheritance and have the ability to transmit it to their offspring.

Dairy farmers will continue to carry the burden of a large percentage of cows that do not possess the inherent ability to produce a sufficient amount of milk and butterfat to make them profitable until such time as breeding experiments, such as those being conducted by the Bureau of Dairy Industry, point the way to breeding practices that will enable them to produce cattle that will be free of the factors responsible for low production.

Artificial insemination as a means of expanding the use of valuable breeding sires is continuing to receive close study. Many inquiries are being received for information on the technique of artificial insemination. Associations are being organized in many States for impregnating cows in small herds by artificial insemination. The direct transfer of semen to animals in the same or nearby herds has about the same efficiency as natural matings, but the shipment of semen to distant points has not been uniformly successful. Further investigational work is greatly needed on this and other phases of artificial insemination.

(b) Investigations of influence of Feeding and Management on Level and Cost of Milk Production and Growth.--The object of this project is to determine the influence of various feedstuffs on the growth and milk production of dairy cattle; the comparative values of various roughages when cut at different stages of maturity and when made into hay or silage; the effect of fertilization and rotational grazing on the value of pastures for milk production; and the effect of different methods of handling, milking, feeding, exercising, and pasturing on the economy and level of milk production. Artificial drying of roughages is being tried out experimentally. The determination of feeding methods and rations for calves to reduce mortality and assure growth during the early months of life is also an important phase of the work.

The Soil Conservation Program of the Department has brought about shifts from soil-depleting grain crops to soil-conserving crops such as grasses and legumes. This shift has created problems in utilizing pasture and hay crops.

Investigations have shown that well-cured hay and properly

preserved silage made from similar crops and harvested at the same stage of maturity have an equivalent feeding value. Other investigations have shown that succulence in the ration is of little or no importance. The principal advantage, therefore, of converting a crop into silage instead of hay is to avoid weather damage. Because the principles governing the production of good quality silage have not been well understood, farmers have been deluded into believing that some sort of silage preservative, costing about \$1 for each ton of silage, is required by all hay crops in order to guard against failure. The cost of the supposedly necessary preservative has kept many farmers from making silage. Investigations have shown that some but not all of the hay crops require a preservative when the moisture content of the crops is very high, also that by reducing the moisture content by wilting and then effectively excluding air from the silage, any crop can be satisfactorily preserved without the use of any preservative whatever.

Data collected in these experiments show that nutrients for cows can be produced in perennial roughage crops at approximately half the cost of producing nutrients in grains. Twenty-three Holstein-Friesian cows on rations consisting entirely of alfalfa hay, corn silage, and pasture have completed 29 lactation periods with an average yield at maturity of 11,847 pounds of milk and 421 pounds of butterfat. Fifteen cows on rations consisting entirely of alfalfa hay have completed 24 lactation periods with an average yield of 11,125 pounds of milk and 390 pounds of butterfat on a mature basis. Four cows on rations consisting entirely of hay made from immature pasture grass herbage have completed five lactation periods with an average of 11,203 pounds of milk and 400 pounds of butterfat. Because of the lower cost of producing nutrients in the form of roughages, the lower production of cows on rations consisting largely of roughage may be as profitable as the higher production secured by heavy grain feeding.

(c) Investigations of Relation of Conformation to Producing Ability.-- Under this project studies are made for the purpose of determining the relationship, if any, between conformation and anatomy of dairy cows to their producing ability, and to establish, if possible, a scientific basis for judging and selecting dairy cattle from outward appearances.

In the detailed study of the anatomical structure of the udders of more than 400 cows and heifers a number of abscesses, cysts, deposits and lesions of various kinds have been observed, but none have been found that appeared to be of a cancerous nature. In view of the high incidence of cancer in the mammary glands of humans and in some other species it is difficult to understand its absence or extreme rarity in the cow's udder - particularly as that organ is so highly developed functionally, is often of enormous size and is subject to friction, irritation, and bruising. It is none the less impressive and gratifying to know that the source of one of the most important human foods is practically free from cancerous growths, particularly in the light of experimental

evidence that in mice a breast cancer-producing influence apparently can be transmitted in the milk of breast-tumor mothers to the young of cancer-free strains.

The attempt to establish a scientific basis for judging the producing ability of dairy cattle by their conformation is being made by correlating the measurements of the external development of cows of known producing ability with the measurements and weights of their internal organs. This work is being carried on cooperatively with sixteen State experiment stations.

(d) Investigations of the Nutritional and Other Physiological Factors Affecting the Usefulness of Dairy Cattle.-- The investigations being conducted under this project contemplate the determination of the essential elements of a ration that will maintain a cow in good health and optimum milk production. It is evident that in many cases the milk yield is limited and the nutritive value of the milk lowered by specific factors that are lacking in rations which by the usual standards would be considered ample, and that continued subsistence on rations deficient in some respect may result in temporary or permanent failure of the reproductive function or failure to resist infection, thus resulting in large economic losses.

The researches undertaken under this project include among others (1) a critical study of the energy required in the rations of dairy cattle and of the methods of determining the energy value of cattle feeds; (2) the effect of different levels of protein in the diet of a cow upon the yield and composition of her milk, including a study of the metabolism of various protein constituents in relation to milk secretion; (3) the calcium and phosphorus metabolism of dairy cattle, including a study of the effect of growth, health, production, and reproduction of using mineral supplements and roughages of various kinds and quality; (4) an investigation of vitamin A in the nutrition of dairy cattle, including a study of the reproduction of the cow on low-quality hays, the amounts of vitamin A required in dairy rations for growth and for normal reproduction, the effect of various levels of vitamin A in the diet upon the nutritive value of the milk, the rearing of calves on milks that are low in vitamin A content and on skim milk, the vitamin value of various farm feeds, and methods of supplementing vitamin-A-deficient feeds for growth, for reproduction, and in order to produce milk rich in this nutritive essential; (5) a study of the effect of partially deficient rations on fecundity in cattle and small animals, in succeeding generations, in order to get at the nature of some of the dietary factors causing irregularities or complete failure in reproduction with dairy cattle; (6) an investigation into the changes in milk coincident with the onset of mastitis and the factors causing these changes; (7) investigation on the physiology of milk secretion, including a study of the relation between the diet, the composition of the blood, and the composition and secretion of milk.

The work on the relation of the glands of internal secretion to lactation, and on the physiology of reproduction in livestock - particularly the physiological conditions affecting fertility - are conducted jointly with the Bureau of Animal Industry under this project.

(c) Studies of Dairy-Herd-Improvement Association Records to Determine the Effect of the Application of Breeding and Feeding Practices on Level and Economy of Production. - There are more than 1,200 dairy-herd-improvement associations operating in the 48 States, Puerto Rico, and Hawaii testing more than 625,000 cows in approximately 25,000 dairy herds. In 1938 these cows produced an average of 317 pounds of butterfat. There are in the United States approximately 25,000,000 cows kept for milking purposes. The latest available data show that these cows have an average butterfat production of only 170 pounds per year, or approximately one-half that of the cows on test in dairy-herd-improvement associations. Feed and production records obtained in all herds on test in dairy-herd-improvement associations are analyzed to show, under actual farm conditions, the most efficient and profitable feeding and herd-management practices, in order that those practices may be recommended for adoption by dairymen generally.

Production, value of product, feed cost, and income over feed cost are calculated for each cow on test. With this detailed information the dairyman may intelligently discard low-producing, unprofitable cows from his herd and adopt better feeding practices. The feed and production records are summarized and analyzed by herds, by associations, by States, and for the United States. These analyses are made available to the State colleges to be used by them in connection with their extension programs to promote the adoption of improved practices.

Improving dairy herds through culling, feeding, and management has definite limitations, as a herd can not be made to produce more than its inherent or natural capacity to produce. Genuine herd improvement, therefore, must come through breeding. Dairymen generally, however, are having discouraging and costly experiences in improving the breeding of their dairy herds. A dairyman may be successful in selecting a bull that will improve his herd, but experience shows that two times out of three he will, if left to his own initiative, select a sire that will lower the average production of his herd.

To cope with this situation and to assist dairymen in selecting bulls that should improve their herds, the production records obtained in dairy-herd-improvement associations are being used as the basis of a nationwide sire-proving program, more comprehensive in scope than any dairy cattle breeding program ever conducted in this or in any other country. In a sense, the 625,000 cows on test serve as a breeding herd to supply improved breeding stock for our national dairy herd of 25,000,000 cows. To accomplish this task breeding stock, particularly sires, must be made available in

great numbers. To place this far-reaching program into operation it is necessary to identify all animals on test. Approximately 80 percent of the animals in association herds are grades and in the past have not been satisfactorily identified. A nationwide ear-tag identification plan was developed through which every grade or non-registered animal is given a special ear-tag number. With complete identification records of grade as well as purebred animals, blood and family lines may be traced and evaluated in all herds in dairy-herd-improvement associations. Complete identification and production data for the 625,000 cows in association herds are being assembled in a permanent record system established in the Bureau of Dairy Industry. The records are filed so as to show every dairy cow family represented in the 26,000 association herds. The data are used to indicate the breeding value of every sire used in every association herd. As the work progresses from year to year, proved sires and the sons of proved sires, by the thousands, will be located and made available. Eventually it will be possible to have in every dairy section several sires on which data are available to indicate their breeding value. When this situation prevails the demand for improved breeding stock may be satisfactorily supplied.

To disseminate all available information on dairy sires, a proved-sire record for each sire is issued to the owner and to dairy leaders in the States. The genetic make-up of sires is indicated so that inferior ones may be discarded while superior ones may be retained for more extensive use. Complete genetic analyses are made of association herds to indicate those animals and families of animals that seem to possess the ability to transmit to their offspring an inheritance for high-producing capacity. The influence of the superior animals and families may then be perpetuated and disseminated throughout the dairy-cow population. At six-month intervals the records of all proved sires are published for general distribution in order that information on proved dairy sires may be available to dairymen and dairy leaders generally. A bull association program is sponsored and directed by the Bureau of Dairy Industry to demonstrate the advantages of an organized dairy-cattle breeding program for a community and the economy of cooperative ownership and use of herd sires. Bull associations provide the facilities for long and extensive use of good proved sires. Through bull associations outstanding proved sires, regardless of their age, are usually more completely utilized and their influence more widely disseminated than if they are owned by individual dairymen.

Often a dairyman loses money on his farm business as a whole even though he has a high-producing herd. In such cases financial records to supplement the feed and production records will show the weak and strong points in the organization and operation of the farm. It may be that the income from the dairy herd is being wasted by uneconomical feeding and care, paying extravagant prices for new stock and having only cull stock to sell, inefficient crop production methods, high expenses for buildings and equipment, etc. Recognizing that efficiency

in farm organization and operation is necessary to obtain the greatest net farm income, complete financial records are now being obtained on many farms in dairy-herd-improvement associations. This phase of the project is conducted in cooperation with the Bureau of Agricultural Economics and the analysis of the records obtained is being done under the joint supervision of the two bureaus. The results of the analyses of farm management and dairy production data will be returned to the State colleges for use in promoting more profitable practices.

3. Market-Milk Investigations.--Under this project investigations are conducted in sanitary and economical methods of producing, transporting, processing, and distributing market milk and cream to be utilized in fluid form. These investigations include the production and handling of market milk under experimental as well as practical conditions on dairy farms, and a study of community milk improvement through milk-control and extension agencies on the area plan. Investigations of the construction, equipment, and efficient operation of milk plants for the processing and preparation for the market of fluid milk and cream and investigations in the laboratory and at commercial dairy farms and plants to ascertain factors affecting the marketability of milk and cream are also conducted. Among the studies now being carried on are trials of the phosphatase test, which is designed to detect improperly pasteurized milk; together with variations of the test which may make it quicker and more accurate. The development of other tests for the same purpose which may have superior advantages is the objective of this phase of the work. An experimental study of the pasteurization of goats' milk is being carried on in cooperation with the Bureau of Animal Industry. This is designed to discover whether or not pasteurization of goats' milk alters materially any of its properties. Extensive experimentation is being carried on with short tests such as the methylene blue test and other criteria which may possibly be used to evaluate the sanitary quality of milk, where facilities are not available for complete bacteriological examinations. This will be especially useful in the field, at country plants, and in small towns and villages. Studies are being made on the curd tension of milk treated in various ways, with the object of finding methods which will make a soft-curd milk. In this connection, corollary studies are being made of curd size and digestibility of milks of various curd tensions.

The purposes of the work being conducted are to prevent losses due to souring, spoilage, and other causes; to increase the market value of milk to the farmer, increase consumption of milk, and make rural and urban milk supplies more safe; to effect economies in initial investments and operating costs of milk plants so as to reduce the spread between producers' and consumers' prices through greater efficiency in plant operation; and to discover undesirable practices which impair the market qualities of milk and cream and devise remedial measures.

The results of these researches enable dairymen to reduce losses through rejected and low-quality milk; extend markets over greater areas; tend to hold down the "spread" between producer and consumer by the introduction of more efficient methods; and increase consumption because of a more acceptable product.

3. Investigations of the Utilization of Milk in the Manufacture of Milk Products.---Nearly one-half of the milk produced in the United States is used in making manufactured products. While the consumption of fluid milk is relatively high, the per-capita consumption of manufactured milk products is much lower than in most other dairy countries. This is due in some measure to the inferior quality of much of the domestic product, and this in turn is due to a lack of understanding of the fundamental principles involved and the absence of scientific control of manufacturing methods. Even under good conditions there are losses from abnormal bacterial fermentations and faulty technique.

In addition to the primary products made from milk, enormous quantities of byproducts (skim milk, buttermilk, and whey) are produced. Although the cost of producing the milk solids in these byproducts is nearly as great as the cost of producing the milk fat, adequate methods of converting the solids of these byproducts into human food have been devised to only a limited extent. The object of this project is, therefore, to discover the basic principles involved in handling milk and manufacturing it into various products and by the application of these principles to improve the quality and reduce the cost of manufacture; also to develop the domestic manufacture of certain dairy products now imported from foreign countries and to establish these methods in the industry. The work is conducted under the following projects:

(a) Basic Investigations of the Bacteriology and Chemistry of Milk.--- The manufacture of all dairy products is based on the control of bacteriological and chemical changes in milk, and the results of studies of these changes provide the basis for all laboratory investigations of an applied nature. Therefore, work on the bacteriology and chemistry of milk is fundamental to practically all investigational work dealing with the manufacture of milk products. The work of the Bureau has included many investigations of an abstract nature which are of interest primarily to scientists. Such studies have frequently led to unforeseen results of great commercial value. At the present time these investigations include:

- (1) A study of the physico-chemical relations of the constituents of milk with reference to the stability of the various suspensions and solutions.
- (2) The composition of milk fat with special attention to the identity and characteristics of some of the minor constituents.
- (3) The effect of one species of bacteria on the development of another species when they are grown together. In some cases there is a mutual stimulating effect but in others a marked inhibitory effect. This is of special importance in selecting cultures of bacteria for cheesemaking and other manufacturing purposes.
- (4) Study of the factors which influence the germination of bacterial spores and their destruction by heat, ultraviolet rays, etc.

(b) General Investigations of Ice Cream Manufacture.---Ice-cream making has been developed almost entirely by empirical methods, with little understanding of the physical and chemical principles involved. The rapid development of the industry from small plants operating a single freezer to great factories supplying large districts has introduced many problems in connection with the collection and storage of raw materials and the production of a uniform product. The purpose of these investigations, in addition to solving manufacturing difficulties, is to develop methods of manufacture whereby the quantity of milk solids may be increased and the quality of the product improved.

A systematic study is being made of the numerous factors which influence the physical properties of ice cream with the object of formulating the control of homogenization pressures and temperatures, freezing temperatures, whipping times, and other manufacturing details to enable the maker to obtain ice cream of any desired character.

Methods are developed for separating the constituents of milk so that larger amounts of milk solids may be used without encountering defects produced by an excess of milk sugar.

(c) General Investigations of the Manufacture of Butter and Byproducts.---In the manufacture of butter and cheese over 5,300,000,000 pounds of milk solids are produced annually in the form of skim milk, buttermilk, and whey. While only a relatively small part of this is actually wasted, yet from the standpoint of its high food value the most of it is utilized very inefficiently. The investigations of the Bureau are directed toward a more efficient utilization of these byproducts by converting them into forms which may be used in human foods and by developing new industrial uses for those which are not suitable for food. The more important projects on which the laboratories are now actively engaged include:

- (1) A method of preparing a concentrated cheese whey suitable for confectionery, cakes, and other foods. This whey is now in commercial production and is increasing the utilization of milk constituents in confectionery.
- (2) An entirely new process for separating the constituents of whey has been developed. This yields three products: Lactose of pharmaceutical grade; a powder of high protein content and excellent whipping properties; and a residue containing the vitamins of the whey in a concentrated form. The process is in the pilot-plant stage, but plans are being made for two commercial plants in which it will be used on a large scale.
- (3) The conversion of lactose of casein and cheese whey to lactic acid by fermentation, the purification of the acid, and development of methods for making solvents, lacquers, plastics, and other products of commercial value. The manufacture of lactic acid from whey is now established on an extensive commercial basis and a method for making from lactic

acid a plastic material having wide commercial application has been perfected and made available.

- (4) The development of a process available to American manufacturers, without payment of royalties, for making from casein a textile fiber resembling wool. The laboratory stage of this investigation has been completed and the pilot-plant work carried far enough to show that a satisfactory yarn can be made.

(4) Condensed, Evaporated, and Dried Milk Investigations.---Three methods for the preservation of milk have been successfully developed commercially. These are the evaporation of milk under vacuum with the addition of sufficient cane sugar to preserve it (condensed milk); evaporation under a vacuum and heat sterilization in the final container (evaporated milk); and reduction to dryness (dried milk). The first method changes the composition of the milk and is falling into disuse. The application of the second is limited because the sterilization gives the milk a slightly cooked flavor which makes it less desirable than fresh milk. The powder obtained by the third method soon acquires an off-flavor through oxidation. If it were possible to prepare a concentrated milk which would keep indefinitely and, on restoration to its original volume, have the flavor and nutritive value of fresh milk, the problem of distribution would be greatly simplified and consumption increased. If the bacterial spores which make necessary the high heat required for sterilization could be made more sensitive to heat, the sterilization temperature of evaporated milk could be materially lowered, with a consequent elimination of the cooked flavor of this product. Other possibilities of improving the flavor of evaporated milk are also investigated.

(e) General Investigations of Cheese Manufacture.--- The United States makes over 600,000,000 pounds and imports over 60,000,000 pounds of cheese annually. To make the quantity of cheese imported would require the milk from 150,000 average cows. This imported cheese is nearly all of those varieties which command relatively high prices and consequently yield greater returns to the producers of the milk than the ordinary Cheddar cheese.

While the quantity of cheese manufactured in this country is greater than in any other single country, the per-capita consumption is lower than in most of the other dairy countries, due partly to the low quality of a part of the domestic cheese and in some measure to the unattractive packages in which it is marketed. If this country's per-capita consumption of cheese were on a par with that of most European countries, the number of dairy cows producing milk for cheesemaking would have to be at least doubled in order to supply the necessary amount of milk.

Investigations being conducted by the Bureau of Dairy Industry have for their object the determination of the biological and chemical factors involved in the production of the characteristic flavors and physical properties of various foreign and domestic varieties of cheese

as well as the improvement of the quality of domestic cheese to provide an additional market for milk.

The more important investigations on which the laboratory is now working include:

- (1) Methods of factory control of the composition and bacterial fermentations in Swiss cheese to insure a more uniformly high grade of cheese. This includes a study of the possibility of making this cheese from pasteurized milk, thus eliminating the defects due to inferior milk.
- (2) Study of the relationship of the bacteriological condition of the milk, the rate and extent of acid development in the manufacturing process, and the temperature of curing to the quality of Cheddar cheese. This has progressed to the commercial operation stage and it is now possible for a factory by applying the principles developed in these investigations to make uniformly high-grade cheese.
- (3) Perfection of a process of making cheese from homogenized milk so that it will not leak fat when exposed to a high temperature and for making a palatable cheese with good keeping quality from milk with little or no fat.
- (4) Development of a method for packing cheese in valve-vented cans. The packaging of Cheddar cheese in consumer units and of Swiss cheese in sliced form for restaurants, lunch rooms, etc., are now established on a commercial basis.

(f) State and Industry Relations for Milk Products Manufacture.---

In the research work of the laboratories of the Bureau facts are established which modify existing methods of dairy manufacturing, new processes are established, new products developed, and improved methods of applying scientific control to factory practices worked out. While this information is published in one form or another, much of it has potential value only when factory operators are convinced by demonstration of its practicability.

The Bureau is working in cooperation with State organizations on the introduction of improved methods of making Swiss cheese, on packaging Swiss and Cheddar cheese, on the control of the manufacturing methods for Cheddar cheese, and on the manufacture of lactic acid and derivatives of lactic acid by the fermentation of whey.

(g) Inspection of Renovated Butter Factories (Regulatory).---The administration of regulatory acts relating to sanitary condition of process or renovated butter factories, the inspection of material and ingredients entering into the manufacture of the finished product, the approval of brands and labels used, and the inspection and certification of process or renovated butter intended for export are functions of the Bureau of Dairy Industry conducted under this project. Investigations

of the fraudulent manufacture and labeling of this product are also conducted at the request of and in cooperation with the Bureau of Internal Revenue of the Treasury Department.

SUPPLEMENTAL FUNDS

Project	Obligated, 1939	Estimated obligations, 1940	Estimated obligations, 1941
<u>Special Research Fund, Department of Agriculture:</u> For			
special dairy cattle and			
dairy products researches	\$46,872	\$60,520	\$60,520

BUREAU OF PLANT INDUSTRY

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation Act, 1940	\$202,442
Allotment for transfer in 1941 Estimates from "General Administrative Expenses, Bureau of Agricultural Chemistry and Engineering" (incident to transfer from latter bureau of appropriation for "Fertilizer Investigations") +	7,500
Total available, 1940	209,942
Budget Estimate, 1941	211,932
Increase	<u>2,040</u>

PROJECT STATEMENT

Projects	1939	1940 :(Estimated):	1941 :(Estimated):	Increase
General administration and business service	\$202,049	\$209,942	\$209,942	- - -
Additional for administrative promotions	- - -	- - -	2,040	+\$2,040(1)
Unobligated balance	393	- - -	- - -	- - -
Total appropriation	202,442	(a)209,942	211,932	+ 2,040

(a) Includes \$7,500 transferred from "General Administrative Expenses, Bureau of Agricultural Chemistry and Engineering" in estimates 1941, incident to the transfer of "Fertilizer Investigations" from that bureau to the Bureau of Plant Industry.

INCREASE

(1) The increase of \$2,040 in this item represents the additional amount for administrative promotions necessary to carry out the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

This appropriation provides for the general direction of the research and service activities of the Bureau of Plant Industry, administration of fiscal affairs, general supervision of personnel, and administrative review and preparation of research and other publications and bibliographical and related work.

The research of the Bureau of Plant Industry is concerned with the problems of growing, harvesting, storing, and transporting plants or their parts, and particularly in removing the hazards of production and in improving quality

of all crops. This research includes fundamental studies of the soil in relation to plant production; the classification and mapping of soils as an aid in using them intelligently; soil tillage and management in preparation for crops; crop rotations and sequences; crop fertilization; liming; use of animal and green manures; weed control; irrigation; methods of propagating and planting; time of planting; harvesting, transportation, storage, diseases and their control, including seed treatment, spraying, etc; improvement by breeding to remove hazards and to improve quality through more desirable composition for various purposes and for resistance to diseases, insects, heat, cold, drought, or other deleterious factors; studies of inheritance for use in breeding; studies on the relation of temperature, light, humidity, soil moisture, soil nutrients, soil organisms, and other environmental factors on the growth, composition, and quality of plants; the classifying of plants and the study of their characters as a basis for use and improvement; assembling and testing both domestic and foreign plants to determine their use and value in the origination of new and improved varieties and crops.

(b) ARLINGTON FARM

Appropriation Act, 1940	\$49,414
Budget Estimate, 1941	<u>49,834</u>
Increase	<u>420</u>

PROJECT STATEMENT

Projects	1939	1940	1941	Increase
		(Estimated)	(Estimated)	
Arlington Farm - maintenance of facilities for basic plant research	\$48,531	\$49,414	\$49,414	- - -
Additional for administrative promotions	- - -	- - -	420	+ \$420 (1)
Unobligated balance	883	- - -	- - -	- - -
Total appropriation	49,414	49,414	49,834	+ 420

INCREASE

(1) An increase of \$420 is estimated as an additional amount for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.



WORK UNDER THIS APPROPRIATION

A highly improved 400-acre tract is maintained in Virginia, near Washington, D. C., provided with specially equipped laboratories, greenhouses, barns, shops, and other buildings to furnish facilities for conducting experiments and practical farm tests covering a wide range of research work, national in scope, principally for the Bureau of Plant Industry, but also available for the Bureaus of Agricultural Chemistry and Engineering, Public Roads, Entomology and Plant Quarantine, and Agricultural Engineering, the Soil Conservation Service, and other branches. By furnishing similar facilities common to the many activities from a central station, duplication of effort and equipment is avoided and the cost of operation appreciably reduced. This item provides funds for the general maintenance of the plant and farm facilities. The work of other divisions in the Bureau and of other bureaus and departments is conducted at cost on a reimbursement basis.

(c) BOTANY

Appropriation Act, 1940	\$76,635
Budget Estimate, 1941	<u>76,995</u>
Increase	<u>360</u>

PROJECT STATEMENT

Projects	1939	1940 :(Estimated):	1941 :(Estimated):	Increase
1. Botanical investigations . .	\$35,940	\$36,635	\$36,635	- - -
2. Weed control investigations	39,722	40,000	40,000	- - -
Additional for administrative promotions	- - -	- - -	360	+ \$360 (1)
Unobligated balance	973	- - -	- - -	- - -
Total appropriation . .	76,635	76,635	76,995	+ 360

INCREASE

(1) \$360 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.-- Research under this appropriation consists of the identification of wild and cultivated plants; taxonomic studies of special genera to serve as the basis of exploration for native forms of crop plants and as the basis for breeding operations in those fields; special systematic studies of grasses that serve as a basis for forage, range, and erosion-plant collection work; the domestication and improvement of wild plants, particularly the blueberry; and weed control investigations. Botanical studies conducted under this project serve as a starting point for numerous investigations made by the various branches of the Bureau of Plant Industry and other bureaus of the Department. With the increased demands made upon this project by the Forest Service and the erosion-control agencies and the inevitable increase of duties resulting from the development of the National Arboretum, work under this project has become of major importance. The studies and identifications under this project are essential to the development of accurate and dependable plans for future work.

The work in weed control is to determine the most effective and economical methods of controlling or eradicating field bindweed, or European morning glory, and other noxious weeds. Control methods studied include tillage and cultural practices, crop rotations, and the use of chemicals. Field and laboratory experiments are being conducted in seven western states in cooperation with the state agricultural experiment stations. The justification for

these investigations lies in the very wide and rapid dissemination of bindweed in past years and the very great difficulty and enormous expense encountered by farmers in eradicating it. Farms otherwise productive have been abandoned because of bindweed infestation, and in several states the pest is considered so serious that loans can not be secured on infested farms. It is very difficult to eradicate bindweed entirely once it becomes firmly established. It is believed that research with chemical treatments and with cultivating and cropping methods this project will indicate feasible and economical methods of control.

1. Botanical Investigations.-- Work on economic botany consists chiefly of studies and identifications of plants other than grasses for various bureaus of the Department, including the preparation of monographic studies of various crop plants as well as reports on range and distribution of those species that are needed by crop workers in other Divisions. Assistance is also given to agricultural experiment stations, farmers, nurserymen, and other individuals and organizations. Information derived from this work is of primary importance in grazing and erosion work, investigations of plants poisonous to stock, forage experiments, and in the preparation of programs of plant breeding in other Divisions. Correct botanical identification is of primary importance for all breeding projects involving cultivated plants and their wild relatives. Accurate and dependable studies and identifications are essential as a basis for investigations if reliable results are to be obtained.

Work on grass investigations includes systematic studies of both domestic and foreign grasses which serve as a basis for important grass investigations from the forage and erosion standpoint. The collection of grass specimens maintained is the largest and most valuable reference collection in the world. The botanical studies conducted and publications built up as a result of these studies comprise a reference collection of information which is the basis of all important grass investigations of the Department. With the increased importance of forage and soil-erosion projects, this work has become an important factor in the conduct of the investigations. Adequate and accurate reference is essential as a starting point for our grass projects.

The principal work of wild plant improvement has been the breeding of new varieties of blueberries earlier and later than those now in use, or of still better flavor and other desirable commercial qualities, or adapted to a latitude and climate farther south than existing varieties. The wide interest in blueberry culture has developed a rather extensive correspondence on the subject. The blueberry investigations have resulted in the domestication and improvement of the wild blueberry; in the addition of a luscious and healthful fruit to the dietary of city dwellers; in the establishment of a thriving and growing new industry of blueberry culture; and in the utilization of areas of special, strongly acid soils not adapted to other agricultural uses.

A similar project is conducted in breeding American varieties of gooseberries, using native species in themselves suited to our conditions but now of inferior quality.

2. Weed Control Investigations.-- The annual loss from weeds in the United States is variously estimated at from \$1,000,000,000 to \$3,000,000,000. The most serious of these losses are caused by perennial weeds which can not be controlled by ordinary farm practices, and if neglected may become so bad as to

almost ruin a farm or a farming community. The worst and most widely distributed perennial weeds are bindweed, whitetop, Russian knapweed, leafy spurge, and Canada thistle. St. John's wort and certain other perennial weeds are locally important. It is estimated that bindweed, the most widespread of these pests, now occupies in excess of 1,000,000 acres of good farm land, and that at the rate of spread which has prevailed this will be increased, if not checked, to more than 5,000,000 acres in another five years. Excessive cost is the factor most limiting control of this weed. Research now under way indicates means for reducing the cost of current methods by one half. Continued research should point the way to further improvement. Attention is now directed primarily to bindweed, with some work on whitetop. As bindweed research progresses to a more definite stage of completion more attention should be given to whitetop, and studies should be started on Russian knapweed, leafy spurge, Canada thistle, St. John's wort, nutgrass, and other perennial weed pests.

(d) CEREAL CROPS AND DISEASES

Appropriation Act, 1940.	\$551,121
Budget Estimate, 1941.	<u>501,040</u>
Decrease.	<u><u>50,081</u></u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase or decreases
1. Barley investigations.	\$63,835	\$64,605	\$60,109	- \$4,496 (1)
2. Corn investigations.	129,005	130,305	122,111	- 8,194 (2)
3. Seed flax investigations.	15,130	25,145	21,513	- 3,632 (3)
4. Sorghum investigations.	25,948	26,098	24,534	- 1,564 (4)
5. Oat investigations.	43,325	43,875	39,559	- 4,316 (5)
6. Rice investigations.	43,705	44,155	39,048	- 5,107 (6)
7. Wheat investigations.	214,479	216,938	193,126	- 23,812 (7)
Additional for administrative promotions.	- - -	- - -	1,040	+ 1,040 (8)
Unobligated balance.	5,694	- - -	- - -	- - -
Total appropriation	541,121	551,121	501,040	- 50,081

INCREASES OR DECREASES

The net decrease of \$50,081 in this item for 1941 consists of:

Reductions aggregating \$51,121 under the following projects (1 to 7):

(1) Barley Investigations, \$4,496: This decrease contemplates discontinuing the work on barley cooperative with the State agricultural experiment stations of Colorado, North Dakota and Oklahoma, the cooperative disease work on barley in Idaho, a part of the cultural and improvement work with barley in Oregon, certain improvement and disease studies at Arlington Farm, Virginia, and a proportionate share of Departmental service.

(2) Corn Investigations, \$8,194: This decrease contemplates discontinuing the work on corn cooperative with the State agricultural experiment station in Colorado, work on breeding sweet corn cooperative with the Purdue University (Indiana) Agricultural Experiment Station, a part of the improvement and disease work on corn conducted at Arlington Farm, Virginia, and a proportionate share of Departmental service.

(3) Seed Flax Investigations, \$3,632: This decrease contemplates discontinuing a part of the work on seed flax cooperative with the State agricultural experiment stations in Minnesota and North Dakota, and a proportionate share of Departmental service.

(4) Sorghum Investigations, \$1,564: This decrease contemplates discontinuing the work with sorghums cooperative with the State agricultural experiment station in Colorado and some work on sorghum improvement and disease at Arlington Farm, Virginia, in addition to a proportionate share of Departmental service.

(5) Oat Investigations, \$4,316: This decrease contemplates discontinuing work with oats cooperative with the Colorado and North Dakota Agricultural Experiment Stations, a part of that cooperative with the Oregon Station, some of the improvement and disease work at Arlington Farm, Virginia, and a proportionate share of Departmental service.

(6) Rice Investigations, \$5,107: This decrease contemplates discontinuing rice work cooperative with the Missouri Agricultural Experiment Station, some improvement work at Arlington Farm, Virginia, and a proportionate share of Departmental service.

(7) Wheat Investigations, \$23,812: This decrease contemplates discontinuing the wheat work cooperative with the Colorado Agricultural Experiment Station, the wheat disease work cooperative with the Idaho station, part of the improvement work cooperative with the Oklahoma and Oregon stations, a part of the wheat disease work cooperative with the Kansas station, a part of the wheat quality work cooperative with the Kansas and Ohio stations, a part of the wheat improvement work cooperative with the North Dakota station, work on cereal breeding and diseases at Arlington Farm, Virginia, certain physiological studies in the District of Columbia and a proportionate share of Departmental service.

The reduction contemplates discontinuing the services of personnel as follows:

Departmental:	Field:
1- P-3 Associate Physiologist	1- P-2 Assistant Agronomist
2- CAF-3 Assistant Clerk-Stenographers	2- P-2 Assistant Pathologists
2- SP-2 Assistant Gardeners	2- P-1 Junior Agronomists
1- CU-2 Laborer	1- P-1 Junior Pathologist
	1- SP-6 Farm Foreman
	4- Agents
	1- Laborer
	Several temporary laborers

The distribution of the reduction by geographic divisions is as follows:

Departmental	\$17,421	Minnesota	600
Arlington Farm, Virginia	5,000	Missouri	4,050
Colorado	4,050	North Dakota	3,400
Idaho	3,000	Ohio	1,800
Indiana	4,000	Oklahoma	2,200
Kansas	3,000	Oregon	2,600
			<u>\$51,121</u>

(8) \$1,040 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--Research conducted under this appropriation item includes a wide range of problems concerned with the growing and improvement of cereal crops. This includes experiments designed to develop new and better methods of culture, control of diseases, and improved varieties better in yield, quality, and in resistance to disease, cold, heat, drought and other hazards, as well as experiments on the interrelations of soil fertility, irrigation, cold, heat, drought, light, disease, etc., on the yield and quality of cereal crops. All of these investigations are designed to remove preventable hazards from cereal crop production insofar as possible. Cooperative experiments are conducted with most of the State agricultural experiment stations, and no independent field stations are maintained.

The justification for this work lies in the importance of cereal crops in American agriculture and in the necessity for safeguarding the food supply of the people and their prosperity through solving the many difficult problems involved in cereal production. Cereal crops supply the basic energy requirement in the dietary of our people. They supply principal concentrate food supplies of our livestock and dairy industries, as well as the raw materials of important food and industrial manufactures. Cereal crops are grown on some 225,000,000 acres each year. These crops are the backbone of American agriculture. Increased efficiency and reduced costs through removal of hazards are necessary for more profitable production and the consequent well-being of our agricultural population, as well as that of our urban population through more stable and cheaper food supplies.

1. Barley Investigations.--The acreage sown to barley each year approximates 12,000,000 acres. For the 10 years, 1927-36, the average annual production of barley was 234,895,000 bushels. The greater part of the crop is used for feed. About 65,000,000 bushels are required each year for the malt using industries, principally brewing. During 1925-1929 an average of 32,000,000 bushels was exported annually, recently the amount varying between 5,000,000 and 8,000,000 bushels. Diseases take a serious toll from the barley crop each year, in 1937 the estimated loss totaling 22,000,000 bushels or approximately 10 percent of the total crop. This loss is important not only because of its direct effects in crop reduction, but also because of the effect on use and quality. Scab, helminthosporium blight, stripe, and stem rust seriously reduce malting quality. Scab, causing emesis, makes the grain unfit for feeding hogs and horses. Fortunately varieties resistant to the various important diseases are available, and a breeding program is under way to combine disease resistance with other desired qualities. Malting quality, stiffer straw, cold resistance in winter barley, are other important problems to be solved.

2. Corn Investigations.--Corn is the backbone of American agriculture, the most important single crop grown in this country, and the foundation of much of the livestock industry. About three-fourths of the world's crop of corn is grown in the United States, where it is grown in every state in the Union and exceeds in production and value wheat, oats, barley, rye, rice, and buckwheat, combined. Approximately 100,000,000 acres of corn are planted each year, with an average production of about 2,500,000,000 bushels. About 90 percent of the corn crop is used for stock feed on the farm, only slightly less than 10 percent entering industrial and human uses.

Annual losses to corn from diseases range from 9 to 20 percent. Higher-yielding strains of corn resistant to diseases and insect pests are needed to reduce production costs and to reduce the hazards of production. As a result of 30 years of experimental work by various State agricultural experiment stations and the United States Department of Agriculture, hybrid corn has recently come into general use throughout the Corn Belt. The expansion in the use of hybrid corn during the past four years has been phenomenal. In 1935 slightly less than 500,000 acres were devoted to the production of hybrid corn, whereas in 1938 corn hybrids were grown on approximately 17,000,000 acres. The corn hybrids so far developed have been more productive more resistant to lodging, diseases, insect pests, and other vicissitudes than the standard commercial varieties previously grown. It is conservatively estimated that an increased production of 100,000,000 bushels of corn resulted in the season of 1938 from the planting of corn hybrids. The use of corn hybrids will permit the growing of our corn crop on less land, reducing costs, and allowing better soil conserving practices. Much remains to be done in the improvement of existing hybrids for such characters as disease and insect resistance, the improvement of the parental inbred lines in order to reduce cost of production and lower the price of hybrid seed corn, and the development of desirable hybrids for corn areas not served by present productions.

3. Seed Flax Investigations.--- Seed flax production in the United States is far below domestic consumption, and large quantities of flaxseed are imported annually. An increase in production should be advantageous to flax farmers and to the linseed crushing industry.

Because of extreme drought the acreage of flax grown in the Dakotas and Montana has been reduced greatly in recent years. This accounts for the marked reduction in acreage and production in the United States since 1930 when 3,780,000 acres were harvested and the total production was 21,673,000 bushels. Less than one million acres were harvested in 1937 and 1938, and the production was only 7 to 8 million bushels. As a result of cooperative experiments, flax production is becoming of more importance in Kansas, and also in California and Texas where it is grown as a fall-sown crop mostly under irrigation.

In the Imperial Valley of California flax has been of exceptional value in replacing other crops produced in excess of demand, especially vegetables and melons and alfalfa. The 115,000 acres of flax now grown in California has done much to stabilize and balance agricultural production. In Texas, also, flax appears promising as a crop to replace some cotton. The growing of seed flax is dependent largely on the use of productive, disease-resistant varieties, having a satisfactory yield and quality of oil. Existing varieties are deficient in one or more of these characteristics. There is a further need for improved varieties which are adapted to each of the distinct areas where the crop is grown.

The breeding of improved flax varieties promises to solve these problems.

4. Sorghum Investigations.--- Sorghums are grown for grain or forage on about 10 million acres annually, mostly in the Southern Great Plains.

They furnish much of the grain and forage in large areas where it is too dry or hot for the successful production of corn and legumes. Grain sorghum seed is an unusually good raw material for the manufacture of alcohol. Broomcorn is grown for its brush on about 300,000 acres.

The sorghum crop is subjected to severe ravages from drought, frost, heat, insects, and diseases. Experiments have shown that improved varieties and proper cultural methods may greatly reduce these hazards.

Most of the forage sorghums and some of the grain sorghums have brown seed, which is much less palatable than that of varieties having white, yellow, or red seeds. Palatability can be improved readily by breeding methods.

Accomplishments to date include the development and wide distribution of early, drought-evading varieties such as Sooner milo, Early Kalo, Kalo, Greeley, Improved Coes, and Highland, and of varieties suitable for harvesting with a combine, such as Wheatland, Beaver and Colby. Strains of nearly all varieties of milo have been developed recently which are resistant to the pythium root-rot which is widespread and highly destructive to the older commercial varieties of milo. The palatable Atlas sorgho now widely grown for silage or fodder was developed and distributed about 1928. These new varieties as well as all older commercial varieties are amenable to further improvement. Varieties are now being developed not only for earliness, drought resistance, yield and quality, but also for resistance to chinch bug injury, smut, and bacterial leaf-spot diseases. The quality of broomcorn brush is being improved by breeding for freedom from red stain and for other desired characteristics.

5. Oat Investigations.-- Oats constitute the most important small-grain feed crop of the United States and, among the grains, are exceeded in acreage and value only by corn and wheat. More than 35 million acres are harvested annually. Oats continue to hold a place in the agriculture of the country because of their unique value as an intermediate crop following corn with which to seed clover and grass. Oats also furnish a highly nutritious feed for many classes of farm animals, particularly for breeding and young stock. The yield and quality of the crop frequently is seriously reduced by heat, drought, disease, and lodging. The losses to the oat crop from diseases ranged from about 6 percent to 15 percent from 1931 to 1937. New strains of oats have been developed that have a combination of resistance to smut, stem rust and crown rust. These strains also are more tolerant of heat and have stiffer straw than the varieties now extensively grown. Some of them are being increased for distribution to farmers in 1940. Crown rust was more prevalent and widely distributed in 1938 than in any previous year, and reduced oat production at least one-third. In other years stem rust and smut have taken heavy toll. The growing of the new resistant strains should eliminate such heavy losses in a large measure. Much progress has been made in recent years in the improvement of oat varieties, especially in breeding for resistance to diseases. Additional work remains to be done in breeding for better straw or standing ability, thinner hulls, and consequently higher quality. Breeding for greater resistance to cold, combined with disease resistance, in winter oats for the South also demands further attention.

6. Rice Investigations.-- Rice is the principal crop grown on some 9,500 farms in certain counties or parishes of Louisiana, Texas, Arkansas, and California where soils are heavy and not well suited for other crops. The land, buildings, livestock, machinery, irrigation projects, and mills devoted to the rice industry have an estimated value of about two hundred million dollars.

In recent years the annual rice crop of the United States has approximated 50 million bushels valued at 35 to 40 million dollars, produced on about one million acres.

The trend of rice production has been upward, and, although it is a minor crop, the United States since 1916 has continued to produce a surplus of rice for export. Production has increased more rapidly than domestic consumption, hence the export market has become more important in determining returns to growers.

The continuous submergence of rice land during most of the growing season creates distinct problems in soil fertility, rotation, insect pests, diseases, and culture that require solution. Soil-fertility and crop-rotation problems with rice on submerged land are markedly different from those encountered in growing other grain crops. Varieties of better culinary and milling quality are needed in order to increase domestic and foreign market demands because existing varieties are deficient in one or both of these qualities. Varieties resistant to diseases, lodging, and shattering and of high yielding capacity are necessary if the cost of production is to be reduced.

7. Wheat Investigations.-- Wheat is second only to corn as a grain crop in the United States and is far more important than any other domestic crop as a source of human food. It supports an extensive manufacturing and processing industry and, though less is exported than formerly, plays an important role in trade with foreign countries.

In recent years the total crop for the United States has varied from a low of about 525 million bushels in 1934 to nearly 950 million bushels in 1931. The acreage has varied from about 55,000,000 acres to over 75,000,000 acres.

Much of the fluctuation in the crop is due to winterkilling, drought, high temperatures, lodging, and various disease and insect pests such as stem and leaf rust, bunt and loose smut, Hessian fly, etc. Annual losses to wheat from plant diseases range from 4 to 32 percent. Losses from leaf rust and bunt amount to millions of dollars annually, and stem rust is responsible for severe losses in areas where adapted, resistant varieties are not available. Winterkilling on the average accounts for losses of 30 to 40 million bushels per year, and is especially objectionable because it may practically destroy the crop in certain areas, as in southern Indiana, southern Illinois, and in western Ohio in 1928.

Distinct progress has been made in breeding disease- and insect-resistant varieties and in producing varieties that are more winter hardy and more resistant to heat and drought. The percentage of ears of smutty

wheat arriving at terminal markets in the Pacific Northwest has been reduced from a high of more than 35 percent in 1931 to a low of 7 percent in 1938, due principally to the breeding and distribution of bunt-resistant varieties. Destruction by stem rust in the spring wheat belt in 1938 was much less than would otherwise have been the case had the stem-rust resistant variety Thatcher not been created and introduced to farmers previously. Unfortunately progress toward final objectives requires time. The production of the stem-rust resistant Thatcher wheat, for example, is the result of intensive efforts over a period of more than 25 years. Such a variety, while a great advance, still has weaknesses, such as susceptibility to leaf rust, which can be corrected only by further breeding operations.

(e) COTTON AND OTHER FIBER CROPS AND DISEASES

Appropriation Act, 1940	\$424,385
Budget Estimate, 1941	<u>401,500</u>
Decrease	<u><u>22,885</u></u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increases or Decreases
1. <u>Cotton investigations</u> <u>(production, improvement,</u> <u>and diseases):</u>				
(a) General cotton breeding and improvement investigations	\$99,520	\$101,020	\$96,020	- \$5,000 (1)
(b) Egyptian cotton breeding and improvement investigations	21,919	22,178	22,178	- - -
(c) Sea Island cotton breeding and improvement investigations	14,700	14,700	14,700	- - -
(d) Cotton genetic investigations	52,600	53,800	51,160	- 2,640 (2)
(e) Studies of the structure and growth of the cotton plant and of cotton fibers	9,300	9,300	7,100	- 2,200 (3)
(f) Cotton plant nutrition and other physiological investigations	63,668	64,500	64,500	- - -
(g) Cotton disease investigations	28,000	28,000	28,000	- - -
(h) Cotton quality research from the standpoint of production	38,400	38,400	31,200	- 7,200 (4)
(i) Cotton culture investigations	9,200	9,200	7,200	- 2,000 (5)
(j) Investigations on establishing improved cotton seed stocks, including one-variety community methods	40,000	65,000	59,655	- 5,345 (6)
Total, Cotton inves.	<u>377,307</u>	<u>406,098</u>	<u>381,713</u>	<u>- 24,385</u>

Projects	1939	1940 (Estimated)	1940 (Estimated)	Increases or Decreases
2. <u>Fiber plants, other than cotton, Investigations of:</u>				
(a) <u>Hard fiber studies .</u>	7,550	8,050	8,050	- - -
(b) <u>Fiber flax agronomic and breeding investigations.</u>	4,650	4,650	4,650	- - -
(c) <u>Hemp investigations.</u>	5,513	5,587	5,587	- - -
<u>Total, Fiber crops other than cotton.</u>	17,713	18,287	18,287	- - -
<u>Additional for administrative promotions</u>	- - -	- - -	1,500	+ 1,500 (7)
<u>Unobligated balance</u>	4,365	- - -	- - -	- - -
<u>Total appropriation</u>	<u>399,385</u>	<u>424,385</u>	<u>401,500</u>	<u>- 22,885</u>

INCREASES OR DECREASES

The net decrease of \$22,885 in this item for 1941 consists of:

Reductions aggregating \$24,385 under the following work projects of Project No. 1, "Cotton investigations (production, improvement, and diseases)."

(1) General cotton breeding and improvement investigations, \$5,000: This reduction contemplates discontinuing the work on cooperative cotton breeding and improvement in Arkansas and New Mexico.

(2) Cotton genetic investigations, \$2,640: This reduction contemplates discontinuing the work on cotton genetics conducted as a part of cooperative cotton breeding research in Arkansas.

(3) Studies of the structure and growth of the cotton plant and of cotton fibers, \$2,200: This reduction contemplates discontinuing a part of the cooperative work on cotton plant and fiber growth and structure being conducted at Raleigh, North Carolina.

(4) Cotton quality research from the standpoint of production, \$7,200: This reduction contemplates discontinuing a part of the work on this project being conducted in cooperation with the Division of Cotton Marketing, Agricultural Marketing Service, in the District of Columbia.

(5) Cotton culture investigations, \$2,000: This reduction contemplates discontinuing the cooperative work on cotton culture in New Mexico.

(6) Cooperative investigations on establishing improved cotton seed stocks, including one-variety community methods, \$5,345: This reduction contemplates discontinuing the single variety work in New Mexico, and not initiating such work in Arizona.

This reduction entails discontinuing personnel or positions as follows:

Departmental:

5 - SP-3 (Vacancies, not to be filled)

Field:

1 - P-3 Associate Geneticist (Vacancy, not to be filled)
 1 - P-2 Assistant Agronomist (Vacancy, not to be filled)
 1 - SP-8 Chief Scientific Aid
 1 - SP-4 Assistant Scientific Aid
 1 - SP-3 Junior Scientific Aid
 1 - Agent
 1 - Farm laborer
 Several temporary laborers

The geographic distribution of the reductions are as follows:

Departmental	\$7,200
Arizona	2,000
Arkansas	4,600
North Carolina	2,200
New Mexico	8,345

(7) \$1,500 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.-- The purpose of this appropriation is to improve the quality and bring about more economic production of cotton and other fiber crops in the United States through researches conducted in Washington, D. C., and in cooperation with the State colleges and agricultural experiment stations in the States where these crops are grown. Cotton is, of course, our most important cash crop and the most important agricultural commodity exported from this country. There are more than 2,000,000 cotton growers and more than 10,000,000 farm people, one-third of the total farm population in this country, depending on cotton for their principal income. Improvement in the quality of cottons produced in other parts of the world, resulting in more exacting competition in certain foreign consuming centers, makes it more imperative than ever that the American crop be of the highest quality possible. The exports of cotton from the United States have decreased from an average of 7,622,217 bales for the 5-year period 1929-30 to 1933-34, to 5,598,415 in 1937-38. Increased acre yields with the consequent reduction in the pound cost of production becomes more important as competition increases, and higher yielding varieties and better production practices must be developed to strengthen and fit in with the more definitely planned agriculture of the present and the future.

Agriculture, industry, and certain aspects of national defense depend in part on cordage, fabrics and other materials made from abaca (Manila hemp), sisal, flax, hemp and other plant fibers. This Division is the only agency in the Federal government that attempts to keep up to date and fully informed on the qualities, production, processing and utilization of these fibers.

This work is conducted in cooperation with the Bureaus of Agricultural Economics, Agricultural Chemistry and Engineering, and Entomology and Plant Quarantine of this Department, and with the State experiment stations, extension services, and certain county and other local group organizations.

1. Cotton Investigations.-- For the purpose of improving the quality and economic production of cotton and other fiber crops in the United States, botanical, genetic, pathological, physiological, agronomic and related researches are conducted. These include studies to learn the effect of soil, season, climate, water, fertilizer, cultural, and other factors on the growth of the cotton plant and the yield, quality and value of the fiber and the seed; botanical, genetic and cytogenetic studies of the plant, of the size, shape, structure, chemical, physical and other properties of the fiber, and the structure and composition of the seed to determine how these properties are inherited and how specific properties and combinations of these contribute to use values; the activities and effects of micro-organisms on the lint and seed are studied in order to better understand and if possible prevent deterioration; cotton diseases are studied to determine possible methods of their control, and breeding is done for disease resistance; methods of breeding, developing and utilizing seed stocks of improved varieties of cotton are worked out for standardizing the production of superior strains and varieties in one-variety communities thereby reducing costs of production and resulting in higher prices to the growers for large, even-running lots of better cotton made regularly available.

2. Fiber Plants other than Cotton, Investigations of.-- Work under this project includes the investigation of hemp and flax fiber production in the United States and of hard fibers such as abaca (Manila Hemp), sisal, henequen, and maguey in the tropics; and of all plant fibers, except cotton, used for ropes, twines, yarns, woven fabrics, hats, matting, and stuffing or filling.

Experiments are being conducted to determine the possibility of producing abaca in the American tropics, of developing earlier maturing strains of hemp that will produce seed in the northern states, and fiber flax for improvement of yield and quality. Properties of hemp and flax fiber, hard fiber and other fibers are investigated from the standpoint of their use for ropes, twines, and other purposes.

Flax fiber production is now established as a commercial industry in Oregon, and continued interest is shown there in experimental improvement projects of culture and processing. Recent narcotic legislation relating to hemp has emphasized the importance of developing, if possible, a strain of hemp free of the drug content, that may be used for production of fiber. There is need for continued plant breeding of both fiber flax and hemp and further experimental work with relation to soil types and agronomic practices in growing these crops and preparing the fibers. Hard fibers, produced only in the tropics, are necessary for bindertwine and all high-grade cordage. It is important that coordination be continued between twine and cordage manufacturers in this country and fiber producers in the tropics and that standards of fiber quality be maintained.

(f) DRUG AND RELATED PLANTS

Appropriation Act, 1940	\$47,139
Budget Estimate, 1941	<u>43,700</u>
Decrease	<u>3,439</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increases or Decreases
1. Drug, poisonous, insecticide, oil, and related plant investigations	\$31,409	\$35,279	\$32,555	- \$2,724 (1)
2. Hop production and disease investigations . . .	10,706	11,860	10,945	- 915 (2)
Additional for administrative promotions	- - -	- - -	- 200	+ 200 (3)
Unobligated balance	5,024	- - -	- - -	- - -
Total appropriation	47,139	47,139	43,700	- 3,439

INCREASES OR DECREASES

The net decrease of \$3,439 in this item for 1941 consists of:

(1) A decrease of \$2,742 in drug, poisonous, insecticide, oil, and related plant investigations: This reduction contemplates the curtailment of cultural experiments at Arlington Experiment Farm, Rosslyn, Virginia, and at other points throughout the United States, with drug plants, such as ephedra; essential oil plants, such as mint, dill, and ocimum canum; drying oil plants, such as safflower, perilla and chia; insecticide plants, such as pyrethrum and Devil's shoestring; and tannin plants, such as sumac and canaigre; with proportionate curtailment in Washington services.

(2) A decrease of \$915 in hop production and disease investigations: This reduction contemplates curtailment of cooperative hop work with the Oregon Agricultural Experiment Station at Corvallis, Oregon; with a proportionate curtailment of Washington services.

(3) \$200 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.-- The work under this appropriation consists of investigations of plants yielding drugs, poisons, essential oils, perfumes, drying oils, insecticides and tanning materials with respect to their culture, their constituents and their general possibilities as crops in the United States. It also includes studies on the production of hops with particular reference to harvesting, curing and storage problems, the improvement of quality and the control of diseases, particularly the downy mildew, through field practices and the development of new resistant varieties.

1. Drug, poisonous, insecticide, oil, and related plant investigations

-- Plants that are important sources of products used in the manufacture of medicines, pharmaceuticals, flavoring materials, perfumes, insecticides, tanning materials, paints and varnishes, and related commodities are grown experimentally to determine their cultural requirements, the proper methods of handling, the methods of obtaining the commercial products from them, their qualities under various conditions, and the possibilities of their improvement through selection and other means. This country is dependent upon foreign countries for most of these products and during extensive world disturbances some of them are not available. Their domestic production insures a more steady supply and better quality for the consuming industries. Inasmuch as farmers are entirely unacquainted with the special requirements of such plants, much information must be obtained by preliminary investigations to provide the necessary background for their commercial introduction. New crop possibilities, likewise, are constantly coming under consideration. Thus the problem of poisonous spray residues has led to an investigation of pyrethrum as a domestic crop and of the rotenone-containing native legume, Devil's shoestring, as a crop possibility on the poorer sandy soils in the South. Because chestnut wood, the principal domestic source of tannin, is rapidly being exhausted, investigation of new domestic tannin plant crops has been started.

2. Hop production and disease investigations.-- Under this project the hop-growing industry is assisted along two lines: (a) The relationship of various production factors to the brewing qualities of hops are studied as a means of bringing about a general improvement in the quality and uniformity of domestic hops, and (b) growers are advised regarding cultural practices that reduce the spread of downy mildew and other diseases and instructed in the use of fungicide sprays and dusts to control the losses while a more permanent solution is sought through the development of new varieties with good commercial qualities and resistant to the disease. The annual value of the hop crop in the Pacific Coast States since the repeal of prohibition has averaged over \$6,000,000. The brewing industry is dependent almost entirely on this region for its supply of hops. Unless the downy mildew is effectively controlled or resistant varieties provided, hop growing may have to be abandoned in many localities where it is now an important industry. Aside from the economic loss suffered by the established growers, the resultant shortage would necessitate more extensive use of the more expensive foreign hops, with a corresponding increase in the cost of brewing.

(8) DRY-LAND AGRICULTURE

Appropriation Act, 1940	\$226,828
Budget Estimate, 1941	<u>175,720</u>
Decrease	<u>51,108</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increases or decreases
1. <u>Dry-land agricultural in-</u>				
<u>vestigations:</u>				
(a) Dry-land field				
crop production				
investigations. . .	\$155,605	\$159,862	\$108,034	- \$51,828 (1)
(b) Dry-land fruit				
and vegetable pro-				
duction investiga-				
tions	27,389	28,277	28,277	- - -
(c) Cooperative farm				
windbreak demon-				
strations and ex-				
perimental test				
plantings	26,203	23,689	23,689	- - -
(d) Regrassing inves-				
tigations in dry-				
land areas.	14,991	15,000	15,000	- - -
Additional for administra-				
tive promotions	- - -	- - -	720	+ 720 (2)
Unobligated balance	2,640	- - -	- - -	- - -
Total appropriation	226,828	226,828	175,720	- 51,108

INCREASES OR DECREASES

The net decrease of \$51,108 in this item for 1941 consists of:

(1) A decrease of \$51,828 in the work project "Dry-land field crop investigations". This reduction contemplates discontinuing cooperative dry-land crop investigations at six State sub-stations (Moccasin, Montana; Dickinson, North Dakota; Archer, Wyoming; Colby, Kansas; Garden City, Kansas; and Pendleton, Oregon), and at the Newell, South Dakota, field station of the Division of Irrigation Agriculture; and also contemplates discontinuing three federally-owned field stations, at Lawton, Oklahoma; Big Spring, Texas; and Sheridan, Wyoming.

The reduction contemplates discontinuing the services of the following personnel:

Field -

8 P-3 Associate Agronomists
2 P-2 Assistant Agronomists
1 P-1 Junior Agronomist
7 Laborers
40 to 50 temporary employees.

The distribution of the reduction by geographical divisions is as follows:

Kansas	\$6,475	Oregon	\$4,900
Montana	3,350	South Dakota	4,075
North Dakota	4,375	Texas	7,400
Oklahoma	9,250	Wyoming	12,130

(2) \$720 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.-- To investigate at field stations the agricultural possibilities of the Great Plains and Intermountain areas, a region comprising about 1/5 of the United States. Studies of crops and cultural methods, and the storage and use of soil moisture under the prevailing semiarid climatic conditions, are directed toward the stabilization of agriculture in the region, and in determining the relationships that may profitably exist between the growing of crops, and the growing and utilization of grass in livestock production. Land use practices in the dry-land region are guided by facts accumulated through this experimentation.

The investigations are conducted, generally in cooperation with the State Experiment Stations, or with other divisions of the Department, at (1) field stations maintained by this Division, at Akron, Colo., Tucuman, N. Mex., Mandan, N. Dak., Lawton, Okla., Woodward, Okla., Big Spring, Tex., Dalhart, Tex., and Sheridan, Wyo.; (2) field stations maintained by the Division of Irrigation Agriculture, at Huntley, Mont., and Newell, S. Dak.; and (3) State substations, at Colby, Kans., Garden City, Kans., Hays, Kans., Harve, Mont., Moccasin, Mont., Dickinson, N. Dak., North Platte, Nebr., Pennington, Ore., and Archer, Wyo.

Dry-land agriculture investigations are of four major types:

(a) Dry-land Field Crop Production Investigations.-- Storage of moisture in the soil and its efficient use are basic objectives. Rotation and tillage experiments and soil moisture studies are conducted on field plots, with wheat, the chief crop in the area, oats, barley, sorghums, corn, and other cereals, forage crops, and cotton.

Yields are secured annually from nearly 4,000 plots. Meteorological data taken close to the fields upon which the crops are grown affords a sound basis for study of the relations between crop yields and climatic factors. The relationship of soil moisture at seeding time to wheat yields, established on these field stations, has influenced or determined loaning policies of the Farm Credit Administration and the Farm Security Administration; and regulations of the AAA in adjustment programs, and is being used by County and State planning boards in formulating their programs. Data on climate and yields have been largely utilized by the Federal Crop Insurance agency in determining rates for crop insurance in the region. The Soil Conservation Service makes continual use of the experimental data in developing action programs on its many projects in the region. Special problems are connected with varietal adaptation, cropping limitations, and with the relation of tillage to nitrification and the storage of nitrates.

(b) Dry-land Fruit and Vegetable Production Investigations.--- The dry-land region lacks home-grown fruits and vegetables and information on their production. It is not now and is not suited to become surplus producing in fruit and vegetable crops. Work under this project is directed to determining the feasibility and methods of growing needed fruits and vegetables for home use, and to developing adapted varieties, involving selection to improve native types and hybridization of native and commercial sorts. Some notable improvements have been made in varieties better adapted to the dry lands, and in developing methods of production with windbreak protection and by means of cultural and rotation methods. Investigations at dry-land stations in the Southern Plains have shown that setting of tomato fruits, which is often poor in dry seasons, may be materially increased by the application of fertilizers to the soil. These stations have determined also that grapes are a very successful fruit crop, even in the driest sections, and the only long-lived fruit yet found that is successful there.

(c) Cooperative Farm Windbreak Demonstrations and Experimental Test Plantings.--- Experiments are conducted on farmstead windbreaks in the northern and southern sections of the Great Plains. Basic data are collected at field stations and on farms selected to represent a wide range of soil types and climatic conditions, on methods of tree and shrub planting and success of plantings, root development on different soils, species best suited for various types of soil and in different areas, and soil moisture in plantings under different soil management and farm management practices. About 6 million trees have been produced in station nurseries and used in these experiments on stations and with cooperating farmers since the work was started at Mandan, N. Dak., in 1914, and at Woodward, Okla., in 1930. Several thousand species of plants, both native and foreign, have been tested at stations to determine their adaptation and their suitability for use in windbreaks. The results of these tests have been utilized widely by the Soil Conservation Service in operations in the dry-land area, and in the Great Plains farm windbreak operations. To these activities the dry-land station data have been basic.

(d) Regrassing Investigations in Dry-land Areas.--- The use of grasses and sod crops in rotations appears desirable but under dry-land conditions is beset with many unusual difficulties. Many of the relations of sod to cropping practices remain to be determined, such as, the possibilities of interchange of sod and cultivated crops, the effect on the soil of sod in the rotation, its effect on storage of moisture, and the ultimate effects of these on crop production. The Soil Conservation Service, Farm Security Administration, and the AAA have been utilizing available information on grass in their operations, but are in urgent need of much additional information to effectuate their programs. These experiments are directed to answering these fundamental problems.

(h) EXPERIMENTAL GREENHOUSE MAINTENANCE

Appropriation Act, 1940	\$77,372
Budget Estimate, 1941	<u>78,212</u>
Increase	<u>840</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
Maintenance and operation of experimental greenhouses and adjacent experimental grounds: and plots	\$76,608	\$77,372	\$77,372	- - -
Additional for administrative promotions	- - -	- - -	840	+ \$840 (1)
Unallotted balance	764	- - -	- - -	- - -
Total appropriation . . .	77,372	77,372	78,212	+ 840

INCREASE

(1) \$840 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

Under this appropriation, a range of greenhouses is maintained at Beltsville, Maryland to furnish experimental facilities for plant experimentation and research. The experimental work includes studies of diseases of flowers, fruits, and vegetables, hybridization and plant breeding, physiological studies, and a wide range of other plant experimental work.

(i) FERTILIZER INVESTIGATIONS *

Appropriation Act, 1940 (Bureau of Agricultural
Chemistry and Engineering) \$225,000*
Budget Estimate, 1941. 240,525
Increase 15,525

*NOTE. -- This item transferred to the Bureau of Plant Industry from the Bureau of Agricultural Chemistry and Engineering. As a continuation of the reorganization within the Department started in 1939, and as a part of which the work on Soil Survey, Soil Chemical and Physical Investigations, and Drainage Investigations were transferred to the Bureau of Plant Industry in the 1940 Agricultural Appropriation Act, the estimates for 1941 contemplate transfer of the work on fertilizer investigations from the Bureau of Agricultural Chemistry and Engineering to the Bureau of Plant Industry, in order to provide for closer coordination and administration of all research work in the general field of soils and soil fertility.

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. <u>Fertilizer investigations:</u>				
(a) Mixed fertilizer investigations.	\$56,710	\$66,000	\$66,000	- - -
(b) Potash fertilizer investigations.	30,842	39,000	39,000	- - -
(c) Phosphate fertilizer investigations.	25,868	35,000	35,000	- - -
(d) Nitrogen fertilizer investigations.	34,126	55,000	55,000	- - -
(e) Catalyst investigations in nitrogen and phosphate fertilizer production	29,847	(a)	(a)	- - -
(f) Biochemical fertilizer investigations.	29,648	30,000	30,000	- - -
(g) Fundamental physical and chemical fertilizer investigations.	55,417	(a)	(a)	- - -
(h) Relocation of fertilizer laboratory.	- - -	- - -	15,000	+ \$15,000 (1)
Additional for administrative promotions	- - -	- - -	525	+ 525 (2)
Unobligated balance.	1,342	- - -	- - -	- - -
Total appropriation.	263,800	225,000	240,525	+ 15,525

(a) The changes in allotments under the Fertilizer Investigations appropriation are due primarily to a reduction in the appropriation of \$38,800

for the fiscal year 1940 which has necessitated a rearrangement of the different lines of work. This rearrangement, aside from providing for the decrease of funds, permits more emphasis on the practical as well as basic investigations with the problems encountered in the production of new fertilizer materials and mixtures. It seemed better to discontinue certain work projects as separate units than to reduce all of them, so that a coordinated and correlated program could be developed, resulting in economies in operation and greater administrative efficiency, with the funds available.

INCREASE

The increase of \$15,525 in this item for 1941 consists of:

(1) An increase of \$15,000 for relocation of the fertilizer investigations laboratories, the major portion of which is in the Ohio Building of the American University, to the Fertilizer Investigations Laboratory building now under construction at Beltsville, Maryland. The relocation of this laboratory involves the actual moving and installation of heavy equipment, offices, and shops, including supplies and scientific apparatus. This action will release the amount of \$14,800 carried in the subappropriation, "Rent of Buildings in the District of Columbia", Office of the Secretary, which is the present annual rental paid American University for the Ohio Building in which the major portion of the fertilizer investigations is now housed.

(2) \$525 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General--Work under this appropriation consists of investigations for the purpose of developing methods for the utilization of our many natural resources and by-products to give farmers the greatest value for the money they invest in fertilizers. The farmers of the United States normally use from 7,000,000 to 8,000,000 tons of commercial fertilizer each year at a cost of approximately \$200,000,000. Investigations are being conducted to determine how to improve the quality of fertilizer materials and mixtures to give maximum beneficial effects to crops and soils, and to improve their physical condition to facilitate handling and distribution in the field; to increase the plant nutrient content of fertilizers through eliminating fillers, thus reducing handling, bagging, storage and transportation costs and the price to the farmers; and to utilize new sources of raw materials, or low-grade materials formerly wasted, and of by-products from the industries.

Investigations of the production of suitable forms of fertilizer ingredients--nitrogen, phosphoric acid, potash, and soil amendments such as lime, sulphur, magnesium, and manganese--are being made. Similarly, studies are being conducted to determine the most efficient and economical processes for the preparation of such fertilizers as potassium nitrate, potassium sulphate, urea, organic phosphates, ammoniated peat, etc. All these researches will be conducted in cooperation with State agricultural experiment stations and other government agencies.

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The solution of these main problems also calls for the use of basic data that can be obtained only by a comprehensive research program. The development of suitable fertilizers and methods for their more efficient use as plant nutrients is of vital importance in the profitable production of crops and in such national problems as soil conservation and flood control, the proper utilization of land, rehabilitation, and the conversion of a large acreage of unproductive land into grasslands and forests. As our lands become less fertile through cropping and erosion, all of the above problems become even more important.

Mixed Fertilizer Investigations.---The purpose of this project is to study the behavior of the several ingredients of a complete fertilizer when mixed together, with a view to reducing the cost of mixed fertilizers, improving their chemical and physical properties, and increasing their efficiency in promoting crop growth on the different soils. Over 70 per cent of the fertilizer materials consumed in this country are used as mixed fertilizers that are produced by mixing materials obtained from widely separated sources and in different proportions to give the various grades of fertilizers required for different soils and crops. Already fertilizer research has accomplished much through the development of improved methods of manufacture of mixed fertilizers. Because of great industrial changes in the manufacture of phosphatic fertilizers, or nitrogen-carrying materials, and of other products used in the fertilizer trade, new materials are constantly being made available for mixing. Many of these materials cannot be mixed successfully without special precautions. The improper or haphazard mixing of many fertilizer ingredients results in great chemical losses of plant nutrients or structural deterioration of the fertilizer. Since the cost of transportation and handling is such a large part of the retail cost of a fertilizer, the retail cost per unit of plant nutrients can be greatly reduced through concentrating the fertilizer. It costs as much to handle a ton of low-grade material as it does a ton of high-grade fertilizer. Because of the great variety of soils and crops in our country, a large number of different mixtures are required. For many sections fertilizers are required that are not acid, or that contain the proper amounts of such secondary elements as magnesium, sulphur, copper, manganese, boron, and zinc. These must be mixed very carefully and uniformly so they may be applied in an economical way in order to get the maximum benefit of all of the elements in the mixture. In order that the farmer may have the advantage of cheaper plant nutrients in the form of concentrated fertilizers, that he may have the fertilizers best adapted to his particular conditions, and that these may be applied evenly and correctly, the properties of fertilizer materials and their behavior in fertilizer mixtures should be given careful study.

Potash Fertilizer Investigations.---The primary object of the work under this project is to develop practical processes for the production of essential potash fertilizers at minimum costs from the widely distributed potash resources of the country in order that the needs of American farmers may be satisfied independent of foreign sources. Farmers are now using about 375,000 tons of potash, the larger part of which is contained in mixed fertilizers. Before the World War most of the potash salts used in fertilizers were imported from foreign countries. Now a large part of our needs are being supplied by an American industry. The Department has cooperated in the

development of a domestic potash industry which is primarily located in California and New Mexico, whereas the large consuming areas are in the East and South. As a result, a large part of the cost of potash to the farmer is represented by the cost of transportation. These investigations are directed, therefore, toward the development and improvement processes for the production of more concentrated materials that may be delivered to the farmer at a lower cost per unit of plant nutrients, to devising improved processes for producing such specialized salts as potassium sulphate and potassium nitrate, which are now obtained almost entirely from foreign sources, and to the efficient utilization of by-products resulting from potash manufacturing operations. The results of these studies are critically necessary at a time when exports from foreign countries may be reduced in order that farmers may continue to obtain this essential material at reasonable prices.

Phosphate Fertilizer Investigations.---Farmers in the United States are now using more than 4,000,000 tons of phosphate, partly as straight phosphatic fertilizers but more largely in mixed fertilizer along with other plant nutrients. With the increased emphasis upon soil conservation and the use of erosive land for hay and pasture, increased demands for economical phosphatic fertilizers are certain. Since the ordinary superphosphate contains only 16 to 20 per cent of plant nutrients, the retail cost per unit of nutrients is much higher in this material than for the more concentrated forms containing two or three times the amount of nutrients. In order to reduce retail prices which, of course, include the cost of transportation and handling, the development of economical methods for manufacturing the high analyses materials can scarcely be over-emphasized. Since much of the phosphate applied to soils as fertilizers becomes unavailable to plants, one of the most urgent problems is to find ways of overcoming this phosphate "fixation". Special attention must be given to the production of types of phosphatic fertilizers that can be used more economically on phosphorus-fixing soils. The defluorinated and organic phosphates now under investigation offer possibilities in this situation. Although the United States has about 40 per cent of the visible world's supply of phosphate rock, it is of critical importance that this be conserved to the fullest possible extent. The general current practices used in the manufacture of phosphatic fertilizers require the use of high-grade rock, with the result that large quantities of the accompanying low-grade rock are wasted at the mines and that natural deposits of low-grade material cannot be utilized. Conservation of our phosphate resources demands the development of economical methods for using these low-grade and waste materials. Studies are also being made in regard to the detrimental effect of fluorine which occurs in some types of phosphatic fertilizers in order to find out what amounts of fluorine are harmful and how it may be removed in the manufacturing processes.

Nitrogen Fertilizer Investigations.---The object of these researches is to develop new and improved nitrogeous fertilizers from natural resources, by-products, and from commercial nitrogen fixation processes. Over the past few years there has been a replacement of organic sources of nitrogen in fertilizers for the much cheaper synthetic nitrogen compounds. This is partly due to the lower costs of the synthetic compounds and partly due to the

increased demand for some of these organic materials, such as cotton seed meal and slaughter house wastes, for feeding purposes. Although some nitrogen fertilizer is used directly as such, a great deal of it is used in mixed fertilizers. Here there is still a great demand for the organic types because of their desirable properties in mixtures to prevent caking. Also, the organic materials are somewhat more resistant to leaching and become more slowly available than the inorganic compounds, thus giving the fertilizer containing them a longer and steadier effect on plant growth. Many of the synthetic products have a high attraction for the moisture in the air and often become sticky or cake in storage. Promising investigations are under way to develop economical methods for treating peat with ammonia to produce a cheap organic nitrogen material. Urea is becoming prominent as a nitrogen fertilizer but it has a high absorptive capacity for water, which makes its use in many fertilizer mixtures impossible. Several promising methods for treating urea or combining it with other substances to overcome this difficulty are under investigation. Successful efforts from these studies will do much to decrease the cost and improve the quality of a great many types of mixed fertilizers, especially those used on horticultural and other special crops.

Biochemical Fertilizer Investigations.—The object of these studies is to determine the nature and application of biological processes in the fixation of nitrogen and in the development of organic fertilizers. Many microorganisms have the ability to fix atmospheric nitrogen and recent investigations have shown that through certain treatments, such as the addition of small amounts of molybdenum, these organisms may increase their activities several fold. Through the results of these studies, whereby the chemical processes involved in the fixation of nitrogen by organisms is known, economical ways can be developed for increasing their efficiency greatly. Furthermore, a knowledge of the chemical processes involved in the natural fixation of nitrogen leads to improvements in the commercial processes. Many of the organic wastes and crop residues available on farms are not effectively utilized as a source of organic matter and plant nutrients for the soil. Studies are being made to determine economical methods of composting these wastes on the farm, including the addition of special compounds to facilitate their partial decomposition by bacteria, and thus produce a useful and suitable soil amendment.

(j) FORAGE CROPS AND DISEASES

Appropriation Act, 1940	\$313,450
Budget Estimate, 1941	<u>300,720</u>
Decrease	<u>12,730</u>

PROJECT STATEMENT

Projects	1939	1940	1941	Increase or decreases
		(Estimated)	(Estimated)	
1. Alfalfa investigations	\$57,057	\$62,976	\$59,778	-\$3,198 (1)
2. Clover investigations	28,199	28,544	26,821	- 1,723 (2)
3. Soybean investigations	18,518	18,820	17,572	- 1,248 (3)
4. Lespedeza, cowpea, and miscel- laneous legume investigations	39,159	39,650	36,302	- 3,348 (4)
5. Grass investigations	152,219	163,460	159,527	- 3,933 (5)
Additional for administrative promotions	- - -	- - -	720	+ 720 (6)
Unobligated balance	3,291	- - -	- - -	- - -
Total appropriation	298,443	313,450	300,720	-12,730

INCREASES OR DECREASES

The net decrease of \$12,730 in this item for 1941 consists of:

A decrease of \$13,450 under projects 1-5 as follows:

(1) Alfalfa investigations, \$3,198: This decrease contemplates discontinuance of cooperative alfalfa work with the Iowa Agricultural Experiment Station, Ames, Iowa, and with the Division of Irrigation Agriculture at Bard, California; and a proportionate curtailment of Washington services.

(2) Clover investigations, \$1,723: This decrease contemplates discontinuance of cooperative clover work with the Iowa Agricultural Experiment Station at Ames, Iowa; and a proportionate curtailment of Washington services.

(3) Soybean investigations, \$1,248: This decrease contemplates a reduction in Washington services related to cooperative soybean work with all State Agricultural Experiment Stations.

(4) Lespedeza, cowpea, and miscellaneous legume investigations, \$3,348: This decrease contemplates discontinuance of cooperative legume work with the South Carolina Agricultural Experiment Station at the Columbia, South Carolina, (Sandhill) field station; and proportionate curtailment of Washington services.

(5) Grass investigations, \$3,933: This decrease contemplates discontinuance of cooperative grass work with the Michigan Agricultural Experiment Station, East Lansing, Michigan; with the Division of Irrigation Agriculture at Bard, California; and a proportionate curtailment of Washington services.

The reduction contemplates discontinuing the services of the following personnel:

<u>Departmental</u>	<u>Field</u>
1 - CAF 3 Assistant Clerk Stenographer	3 Agents
1 - CAF 4 Senior Stenographer	Several temporary employees

The distribution of the reductions by geographic divisions is as follows:

Departmental	\$7,550
California	1,025
Iowa	1,575
Michigan	1,200
South Carolina	<u>2,100</u>

\$13,450

(6) \$720 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.-- Cooperative research in all States with soil-conserving crops widely used as hay, pasturage, green manure, and cover crops, including alfalfa, clovers, soybeans, lespedezas and miscellaneous legumes, and grasses; to determine best methods of hay and seed production, pasture establishment and maintenance, and disease control; to improve native and introduced species by breeding and selection, and to make available through established distribution channels seed of improved strains.

1. Alfalfa Investigations.-- (a) Cultural and production investigations related to environmental factors and management practices affecting yield and composition; (b) tests of alfalfas from both foreign and domestic sources to determine those best suited to various soil and climatic conditions; selection and breeding of strains capable of withstanding extremes of heat and cold or resistant to drought, disease, or insect injury; and (c) studies of alfalfa diseases, the causal organisms and methods of control.

In 1938 the United States on nearly 14,000,000 acres produced about 29,000,000 tons of alfalfa hay valued at \$290,000,000. The seed crop of 1937 was valued at \$13,000,000. The 1938 acreage exceeded that of 1928 by 2,500,000 acres. This increase, induced by programs stimulating wider use as a soil-conserving crop, was made possible by facts accumulated from long-continued research of the type done under this project. But the further extension of acreage and the successful maintenance of profitable stands on existing acreages is beset with increasing difficulties among which destructive diseases are of special importance. Most widespread is bacterial wilt which

destroys stands in from 2 to 4 years in areas where alfalfa formerly would last 15 or more years. This necessitates more frequent reseeding and, because of the greater cost involved, further reduces net returns. Another disease, confined to the eastern half of the United States, is leafhopper yellowing which not only reduces stands but results in lower nutritional value of hay produced. Other diseases include leaf spot, stem blight, and dwarf, each of which is taking greater annual toll than is generally realized.

Strains resistant to bacterial wilt have been developed but more work is required to test them widely, develop adequate seed supplies and get them into commercial production. Relatively little progress has been made, because of less concentrated attack, on leafhopper yellowing and the other diseases mentioned. Seed yields have declined during the last decade, due to insect injury, and this has limited wider use of alfalfa in soil conservation practices. Among the principal insect enemies are species of Lygus. Certain cultural practices have been developed to aid in the control of these insects, but a Lygus-resistant alfalfa is desirable. An alfalfa with "creeping roots", found in Turkey in 1934, promises to satisfy an increasing demand for a grazing type of alfalfa, but its productivity, still relatively low, awaits improvement.

2. Clover Investigations.-- (a) Cultural and production investigations related to environmental factors and management practices affecting yield and composition; (b) tests of clovers from both foreign and domestic sources to determine relative value under various soil and climatic conditions; selection and breeding of strains capable of withstanding extremes of temperature and of soil acidity or salinity, and resistant to drought, disease or insect injury; and (c) studies of clover diseases, the causal organisms and methods of control.

In 1937 the farm value of red, sweet, and alsike clover hay and seed approximated \$269,000,000, not to mention many other clovers for which statistics are not available. Twelve different clovers are important in one part or another of the United States while many others are important under specific conditions. Losses in stands of clover frequently blamed on the weather are in reality often caused by soil deficiencies, improper cultural treatment, diseases and lack of adaptation to environment.

Combinations of Red clover: Superior stocks for the central and southern parts of the red clover belt respectively are being increased; breeding work aims to develop disease resistant, more productive winter-hardy varieties; breeding for resistance to mildew and southern anthracnose is making definite progress but the isolation, life histories and methodology of inoculation of other organisms awaits further investigation, as do the relation of winter-hardiness to available soil minerals, and the relation of clipping the first crop to yield and protein content. Sweetclover: Livestock interests seek later maturing varieties for pasture, leafy and small stemmed varieties for hay and the corn and grain farmer needs tall and high producing varieties for soil improvement. Stand losses in the spring of the second year are apparently the result of a disease complex on which little information is available. Two diseases, causing a root rot and a stem blight, have been isolated and are being studied. Since coumarin of sweetclover is related to toxicity of spoiled hay, isolation of the toxic fraction is being attempted and breeding aims at developing strains low in or free from coumarin. Strawberry clover, important

in the reclamation of seeped, alkaline soils of the Western States, is being studied to determine its range of salt tolerance. In Southern and Pacific States winter annual species -- crimson, Persian, hop, cluster and subterranean -- promise to become valuable in soil conservation and livestock programs. Preliminary experiments indicate that grass competition at seedling emergence and lack of available phosphoric acid are two of many factors responsible for failures. White clover, important in pastures and lawns, is spasmodic in occurrence, abundant some years and absent others, constituting a problem awaiting solution.

3. Soybean Investigations.-- (a) Cultural and production investigations related to environmental factors and management practices affecting yield and composition of soybean; (b) tests of thousands of foreign introductions to determine range of adaptation, and breeding for superior strains for forage, food or industrial use; (c) preliminary studies of soybean diseases, not yet but potentially serious, their causal organisms and possible means of control.

Within the last decade, the soybean has assumed a place of major importance in the agricultural, food, and manufacturing industries of the United States. More than 200 oil mills and food and industrial establishments are actively engaged in the consumption of domestic-grown soybeans. About 73 percent of the 1937 forty-one million bushel crop was used by the several industries engaged in the manufacture of numerous food and industrial products. The increased interest in soybeans as a food is indicated by the utilization of more than 28 million pounds of bean flour during 1937. The seed crop of 1937, valued at \$35,000,000, represented about one-third of the total value of the crop for all purposes.

Acreage, production of seed, and number of soybean industries are greatest in North Central States. Introduction and improvement of adapted varieties, by the Bureau of Plant Industry and cooperating state experiment stations, have been largely responsible for the concentration of the industry in this area. With the recent readjustment of cotton and sugar cane acreages in the Southern States, soybeans command special attention, promising southern farmers a cash crop and oil mills an additional source of oil. Only about 9 percent of the total soybean seed in the country is now produced in the Southern States. Lack of suitable varieties and to an increasing extent insect and disease injury (not so serious in North Central States), have been principal barriers to establishment of soybean industries in the Cotton Belt. With rapid increase in agricultural, industrial, and food uses, special attention is given to improvement of varieties in oil and protein content and quality, nutritive value, grain yield, effects of environmental conditions on the quality of beans and resistance to diseases and insect attack. (Note: this project is closely coordinated with the agronomic aspects of the research in progress at the United States Regional Soybean Industrial Products Laboratory.)

4. Lespedeza, cowpea, and miscellaneous legume investigations.-- With both summer and winter legumes for forage, cover crops, and soil improvement, including lespedeza, cowpeas, velvetbeans, crotalaria, vetches and fieldpeas; (a) cultural and production investigations aimed at the improvement of methods of using these crops in soil conservation; (b) tests of available species, varieties and strains to determine their range of adaptation; selection and

breeding for superior varieties, and (c) studies of diseases, causal organisms and methods of control.

Emphasis is on the problem of developing for poorer and more acid soils of eastern United States improved legumes that can be grown under conditions where alfalfa and red clover do not succeed. Introduction in recent years of lespedeza and crotalaria, two legumes especially adapted to acid soil, laid the basis for this work. Lespedeza: Over 2,000,000 acres were harvested for hay in 1937, and the acreage of pasture in which lespedeza constituted an important part has been estimated at from 15 to 20 million. Introduction and development of the Korean variety has extended the northern limit of the lespedeza belt far beyond its former boundaries. Prevalence of a wilt disease on Korean makes it necessary to study this disease and breed for resistant strains. Lespedeza sericea, superior perennial for poor acid soils, has proved valuable in erosion control and is regarded as promising forage but breeding work seeks to overcome its major fault of high tannin in the leaves. The Coastal Plains area of Southeastern States, where crotalaria recently indicated its value for improvement of poor sandy lands, now produces about 100,000 acres of this crop, but improved and more widely adapted varieties would make use more general. Research with velvetbeans and cowpeas is confined to a limited study of varietal adaptation and disease resistance. The winter annual legumes used commonly for green manure are being studied from the standpoint of developing varieties that will produce good seed crops in the Southern States where seed production of such crops is not now practical. Pending the development of such varieties, improved methods of seed production in the Pacific Coast States are sought as means of minimizing cost of seed to users in the Cotton Belt.

5. Grass Investigations.-- (a) Cultural and production investigations related to environmental factors and management practices affecting the establishment and maintenance of hay and pasture grasses in meadows and pasture, on ranges and watersheds, for hay, grazing, and soil conservation; (b) tests of introduced and native species, selection and breeding for superior strains for hay or pasture, erosion control or other uses; (c) studies of diseases affecting hay and pasture grasses, the causal organisms and methods of control; and (d) limited turf investigations, cooperative with the Green Section of the United States Golf Association.

About 60 percent of the total land area of the United States is used for pasturage for at least part of each year. Grass is the principal component of pasturage. Grass also supplies about one-third of the national hay-crop. Besides occupying a commanding position as a hay and pasture crop, grass is of utmost importance in erosion control, watershed protection, and soil conservation. Grass, in other words, is basic to the agriculture of America. Yet it was only recently that America came to appreciate this fact and to make possible research with grasses comparable to that long devoted to other crops. Since 1935, under this project, extended grass research has been established and advanced in several of the important agricultural regions of the United States, in cooperation with state experiment stations, the Soil Conservation Service, the Forest Service and other agencies.

The cultural and production investigations with hay and pasture grasses are supported in all regions by breeding and improvement work and disease studies, although, for obvious reasons, the species of the Southeastern States

are different from those in the Northeastern States which, in turn, differ from those of the Great Plains, and so on. In the Northeastern States, work under this project is closely coordinated with that of the United States Regional Pasture Research Laboratory and the twelve States cooperating.

Besides studying the herbage values of different grasses and their fuller use in meadows, pastures, and crop rotations, for feed and soil conservation purposes, much attention is being paid methods of inducing and increasing seed production of improved strains so that these strains may come into use as rapidly as possible through established channels of distribution.

(k) FOREST PATHOLOGY

Appropriation Act, 1940	\$265,392
Budget Estimate, 1941	230,760
Decrease	<u>34,632</u>

PROJECT STATEMENT

Projects	1939	1940	1941	Increase or decreases
		(Estimated)	(Estimated)	
1. Diseases of forest trees and forest products, Investigations of	\$129,371	\$132,569	\$110,969	-\$21,600(1)
2. Diseases of shade trees, shrubs, and chestnut orchards, Investigations of	50,948	50,948	47,156	- 3,792(2)
3. Epidemic tree diseases, Investigations of	71,875	81,875	71,875	- 10,000(3)
Additional for administrative promotions	- - -	- - -	760	+ 760(4)
Unobligated balance	3,198	- - -	- - -	- - -
Total appropriation	255,392	265,392	230,760	- 34,632

INCREASES OR DECREASES

The net decrease of \$34,632 in this item for 1941 consists of:

A decrease of \$35,392 under Projects 1 - 3, as follows:

(1) Diseases of forest trees and forest products, Investigations of, \$21,600: This reduction contemplates discontinuing the field laboratory now maintained in cooperation with the University of Pennsylvania and the Allegheny Forest Experiment Station at Philadelphia; reduction of Oregon-Washington activities headquartered at the Portland field laboratory; practical discontinuance of the work in chestnut disease investigations in eastern United States, with a general reduction in field expense and departmental services in Washington.

(2) Diseases of shade trees, shrubs, and chestnut orchards, Investigations of, \$3,792: This reduction contemplates discontinuing investigations of shade trees at the Allegheny Forest Experiment Station; reduction in the assistance tendered to the National Park Service in diagnosing disease conditions, and reduction of breeding investigations to develop blight-resistant chestnut trees for orchard purposes.

(3) Epidemic tree diseases, Investigations of, \$10,000: This decrease contemplates a reduction in the investigations dealing with Douglas fir canker, white pine blister rust, larch canker, the London plane disease and other epidemic tree diseases.

This reduction contemplates the following distribution by geographic divisions:

Departmental	\$2,600
California	1,992
Georgia	4,300
Idaho	500
Maryland	2,500
Massachusetts	1,000
New Mexico	1,000
Oregon	10,000
Pennsylvania	11,500

(4) \$760 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--- With this appropriation investigations are made of diseases of forest and shade trees and shrubs for the purpose of discovering new methods of control and applying methods of control and eradication already discovered. Decay and discoloration of logs, lumber, posts, pulpwood, and other forest products are also objects of investigation. The Federal and State governments own and manage vast forest areas; results of these investigations are directly applied in the management of these forests, and in addition are utilized by private timber producers and manufacturers and by park managers and tree owners. The extensive development of forestry in the last seven years, including soil conservation work, enlargement of public forests and parks, National and State civilian conservation camp work, and the Tennessee Valley development, has resulted in greatly increased demands for tree disease work. Chestnut blight, white pine blister rust and Dutch elm disease are being followed by new epidemics such as persimmon wilt and sycamore blight, which threaten to destroy other valuable tree species. The State agricultural experiment stations give little attention to forest and shade-tree diseases.

Work on tree diseases, in cooperation with the Forest Service, the National Park Service, the Soil Conservation Service, the Bureau of Entomology and Plant Quarantine, and various States and private institutions, is centered at the following points: New Haven, Conn.; Morristown, N. J.; Philadelphia, Pa.; Asheville, N. C.; New Orleans, La.; Madison, Wis.; Lincoln, Nebr.; Albuquerque, N. Mex.; San Francisco, Calif.; and Portland, Ore.

1. Diseases of forest trees and forest products, Investigations of.--- Commercial forests occupy approximately one-fourth of the land area of the United States; farm woodlots alone have an acreage one-third as great as farm crops. Native diseases, working constantly over the entire forest area, cause

a total damage probably as great as fire. There are 180 commercial species, which are subject to different diseases during each stage of development from seedling to saw log. Timber growers and users are seeking technical aid as never before and the knowledge of these diseases is far behind present needs. This project also includes research on the new naturalized chestnut blight and white pine blister rust.

Diseases are interfering with production in the large public tree nurseries and endangering the plantations for which the stock is designed. For these, direct control methods are devised adapted to local soil peculiarities. In immature forest stands, the different diseases are distinguished, and their effects on yield determined; studies are made of those found economically important, their causes, and the influencing factors that can be modified by forest management. In mature or overmature stands growers and loggers are aided in judging the amount of internal decay and salvaging infected stands with a minimum of loss. In Douglas fir, the most important American timber species, exact studies show the cull from heart rot to average 17% of the commercial volume; information on symptoms and age relations has aided in the efficient utilization of this species, and to a less extent of a number of other species for which further study is needed. In the research on chestnut blight and blister rust emphasis is on the development of resistant forest chestnuts and improved technique in local control of the rust. In all of the work information gained is made directly available to government timberland administrators including the CCC by memoranda and demonstrations, and to interested parties generally by publication.

Studies of fungus injury to forest products are directed at decreasing the losses in handling and storage, and increasing the utility of wood to home builders and other types of wood consumers. Fundamental information on wood decay is supplied to the Forest Service and other investigators of wood utilization and preservation. Treatments have been developed for the control of sap stain in experiments for which the southern lumbermen furnished part of the funds. These treatments are already widely used and have resulted in better lumber for the domestic consumer and foreign market. Cheapening, simplifying, and extending methods for preventing stain and decay benefit both producer and consumer of forest products. (The Forest Service, Bureau of Agricultural Chemistry and Engineering, Soil Conservation Service, Bureau of Entomology and Plant Quarantine, University of Pennsylvania, and the University of Nebraska cooperating.)

2. Diseases of shade trees, shrubs, and chestnut orchards, Investigations of.-- Within the past 30 years the interest of the public in shade trees has increased greatly. The value of these trees, which make up a material part of the wealth of this country, cannot be expressed in dollars. Their historical or sentimental value often surpasses their practical and esthetic value. Hundreds of native and introduced tree species are grown in the United States, and all have diseases, some mild, some serious. Investigating these diseases and formulating methods to control them and prevent their spread are the primary purposes of this project. Large expenditures are made annually by cities, villages, developers of suburban areas, administrators of parks and cemeteries, and millions of home owners, in planting trees, in repairing decayed and damaged trees and in controlling diseases on them. Much additional investigation is necessary to perfect treatments

now in use and to develop better ones. Many diseases have not yet been investigated, and others have been only partially studied. Ill-advised plantings of species or varieties susceptible to certain diseases can often be avoided by use of information secured under this project. City, state, and government officials, commercial arborists and tree owners everywhere ask us for assistance and advice. Consequently a large part of the funds of this project must be used to determine the diseases and answer the inquiries received from the general public.

The scenic beauty and recreational value of the National Parks are largely dependent on their trees. Tree diseases that threaten to detract from the beauty of the landscape or to upset the natural balance of plant associations are investigated as they appear; studies are conducted to prevent or control certain harmful practices such as packing of soil near trees by congested tourist traffic. The National Park Service has put into practice our recommendations in these respects.

Chestnut blight completely destroyed the developing chestnut-orchard industry in the East. Many strains of Asiatic orchard chestnuts have been introduced and are being evaluated. These are hybridized with American and European chestnuts and tested for local adaptability and for resistance to blight and other diseases and for desirable horticultural qualities. These experiments are conducted as a basis for reestablishing the chestnut orchard industry. Such an industry would find an immediately available outlet for its product because 20 to 25 million pounds of chestnuts are normally imported annually. Whenever blight is found in the western states it is promptly eradicated. (National Park Service, and Yale University cooperating.)

3. Epidemic tree diseases, Investigations of.—New epidemic diseases are a standing menace to the existence of American forest and shade trees. Thus far these diseases have been imported from abroad; their source and method of entry are often difficult to determine. Knowledge of their causal agents and their behavior may make it possible to rid the country of these diseases before they become established, or to bring them under control. An effort is made to secure this knowledge promptly. Like the Red Cross the work must meet emergencies when they arise. The greatest need is for advance information concerning threatening diseases which appear in foreign countries, in order to appraise their dangerous possibilities before they reach America, and learn how to exclude them.

Research under this project furnishes the basis for the Federal and State eradication campaigns against the Dutch elm disease. This disease, discovered in Ohio and more recently in Maryland, Virginia, West Virginia, Indiana, and Pennsylvania is very serious around New York City in New Jersey, New York, and Connecticut. It came to America from Europe in burl elm logs imported for cutting veneer. It threatens the existence of all species of American elms. The common elm, our leading shade tree, is the most susceptible species. This elm has been determined to have a value of not less than 660 millions of dollars.

Among diseases of conifers, larch canker, introduced into Massachusetts on European larch and capable of attacking tamarack and western larch, is under investigation and is subject to a state control program. The Coryneum canker of the Monterey cypress in California has been investigated and the results are now being applied in a State control program. Five Douglas fir cankers and a canker of the pitch pines are being studied. A needle cast fungus has recently been causing great destruction of Douglas fir in Switzerland, Austria and Germany. Since Douglas fir is our most valuable commercial timber tree, studies have been started on related fungi in this country and information concerning this disease is being sought.

Among diseases of broad leaf trees work has been begun on epidemic dying of the sycamore already known in Philadelphia, Baltimore and New Orleans, and apparently beginning in Washington, D. C. For several years willow scab, introduced to North America from Europe, and black canker of willow, introduced from Japan, have been spreading destructively in the Northeast and have recently been found in the mountains of North Carolina. Willows are of much importance in holding stream banks. A killing mimosa disease has been discovered in the Carolinas where it threatens extinction of this popular southern ornamental tree. The phloem necrosis of elm in the Ohio River Valley has proved to be an exceptionally destructive virus disease. Preliminary investigation of a wilt of American persimmon reveals that it is one of the fastest killing tree diseases known and that it threatens the existence of this tree. It is already spread through the southeastern states and is making rapid progress. The American persimmon is important in erosion control, valuable as a food producer for wild life and supplies wood useful for certain specialty purposes. (Bureau of Entomology and Plant Quarantine, New Jersey Department of Agriculture, and Ohio Agricultural Experiment Station cooperating.)

(m) FRUIT AND VEGETABLE CROPS AND DISEASES

Appropriation Act, 1940	\$1,348,982
Budget Estimate, 1941	<u>1,254,480</u>
Decrease	<u>94,502</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increases or Decreases
1. Deciduous fruit investigations	\$297,744	\$298,483	\$277,112	- \$21,371 (1)
2. Citrus, avocado, and other subtropical fruit investigations	107,591	107,755	100,040	- 7,715 (2)
3. Nut investigations	236,535	244,109	221,873	- 22,236 (3)
4. Vegetable investigations	250,541	288,023	267,400	- 20,623 (4)
5. Floricultural and ornamental horticultural plant investigations	71,892	71,961	66,817	- 5,144 (5)
6. Nursery stock and farm windbreak investigations	66,699	66,848	65,350	- 1,498 (6)
7. Potato investigations	86,808	87,223	84,328	- 2,895 (7)
8. Methods of handling, transportation and storage, and market diseases of fruits, vegetables, and flowers, Investigations of	169,208	184,580	167,080	- 17,500 (8)
Additional for administrative promotions	- -	- -	4,480	+ 4,480 (9)
Unobligated balance	9,964	- -	- -	- -
Total appropriation	1,296,982	1,348,982	1,254,480	- 94,502

INCREASES AND DECREASES

The net decrease of \$94,502 in this item for 1941 consists of:

A decrease of \$98,982 under projects 1-8 as follows:

(1) Deciduous fruit investigations, \$21,371: This decrease contemplates the abandonment of about 20 acres of experimental vineyard at Oakville, California; the discontinuance of small fruit disease investigations at Willard, North Carolina, and a considerable reduction in the investigations conducted with

peaches, apples, pears, small fruits and grapes in the states of Wyoming, Georgia, Oregon, Washington, California, Texas, Colorado, and Maryland.

(2) Citrus, avocado, and other subtropical fruit investigations \$7,715: This decrease contemplates the discontinuance of part of the investigations with dates, citrus, and avocados in California, and citrus and subtropical fruits in Florida.

(3) Nut investigations, \$22,236: This decrease contemplates a reduction in tung oil investigations in Louisiana, Georgia, and Florida. Pecan investigations will be reduced in Arizona, Georgia, Alabama, Louisiana and Texas.

(4) Vegetable investigations, \$20,623: This decrease contemplates the discontinuance of peanut investigations and a reduction of the investigations dealing with celery, sweetpotatoes, tomatoes, cabbage, muskmelons, and lettuce in California, Georgia, Utah, Louisiana, Mississippi, Texas and Wisconsin.

(5) Floricultural and ornamental horticultural plant investigations, \$5,144: This decrease contemplates a reduction in the investigations dealing with narcissus, chrysanthemums, roses, and lilies.

(6) Nursery stock and farm windbreak investigations, \$1,498: This decrease contemplates a reduction in the farm windbreak investigations in the Great Plains area in Wyoming, Kansas, Colorado, and Nebraska.

(7) Potato investigations, \$2,895: This decrease contemplates a reduction in potato breeding investigations in Maine, Colorado, and Maryland.

(8) Methods of handling, transportation and storage, and market diseases of fruits, vegetables, and flowers, Investigations of, \$17,500: This decrease contemplates reducing the gas storage investigations with fruits and vegetables one half, and the reduction of transportation and storage studies with citrus, apples, peaches, pears, and vegetables in Florida, California, Washington, Oregon, Georgia, and Maine.

The reduction contemplates discontinuing the services of personnel as follows:

Field -

- 1 - P-5 Senior Agriculturist
- 1 - P-3 Associate Horticulturist
- 1 - P-3 Associate Pathologist
- 2 - P-1 Junior Pathologists
- 1 - SP-5 Scientific Aid
- 1 - SP-3 Student Aid
- 1 - SP-3 Junior Scientific Aid
- 50 part-time Laborers.

The distribution of the reduction by geographic divisions is as follows:

Arizona	\$1,500
California	12,550
Colorado	2,000
Florida	8,615
Georgia	7,412
Illinois	1,050
Louisiana	8,930
Maine	295
Maryland	36,210
Mississippi	1,000
New York	1,050
North Carolina	3,570
Oregon	2,250
Texas	5,586
Utah	822
Washington	2,550
Wisconsin	600
Wyoming	<u>2,992</u>

98,982

(9) \$4,480 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--Under this appropriation investigations are conducted to determine the most effective and practicable cultural methods in the production of horticultural crops, as fruits, nuts, vegetables, and ornamental trees, shrubs, and flowers. Studies are made of interrelated soil management practices, effects of different plant foods in relation to nutritional requirements, pruning, irrigating, spraying, and the physiology of plant growth and performance in relation to environmental conditions, including the influence of photo-periodic changes. Much attention is given to breeding horticultural crops with a view to developing varieties that are more disease- and insect-resistant and better adapted to different regions, and possessing better eating and shipping qualities. Research in plant propagation pertains to methods, the determination of superior rootstocks, and their rapid multiplication; the use of plant- and root-growth promoting substances and the application of other improved methods. Studies are made of destructive plant diseases to the end that control measures may be developed, including the use of safer and more effective fungicides. Investigations are made to determine the most desirable stage of maturity at which to harvest fruits and other products, and the most effective methods of handling, transporting and storing them, covering such matters as spray residue removal, precooling, and other handling procedures, refrigeration, and heater car transportation, storage requirements and limitations - all to the end that such perishable products may reach the consumer in the best possible condition and over the longest possible season. In addition to cooperative activities with the state agricultural experiment stations, other bureaus of the Department of Agriculture and the Bureau of Indian Affairs of the Department of the Interior, investigations are carried on at field stations, laboratories and offices at the following points:

Field Stations (Government-owned land or held under long lease)

Beltsville, Maryland	Fort Valley, Ga. (long lease)	Oakville, Calif.
Brownwood, Texas (long lease)	Fresno, California	Orlando, Fla.
Charleston, South Carolina	Indio, California	(long lease)
Cheyenne, Wyoming (long lease)	Meridian, Mississippi	Robson, La.
		Tifton, Ga. (long lease)

Field Stations (land furnished)

Eustis, Florida	Palo Alto, California	Presque Isle, Maine
Greeley, Colorado	Philema, Georgia	La Jolla
		(Torrey Pines), Cal.
		Willard, N. C.

Field Laboratories

Albany, Georgia	Hood River, Oregon	Pemberton, New Jersey
Austin, Texas	Lafayette, Indiana	Pomona, California
Bogalusa, Louisiana	Logan, Utah	Riverside, California

Cairo, Georgia	Los Angeles, California	Shreveport, Louisiana
Chicago, Illinois	Madison, Wisconsin	Columbia, Missouri
Corvallis, Oregon	Medford, Oregon	Vincennes, Indiana
East Wareham, Massachusetts	New Brunswick, New Jersey	Wenatchee, Washington
Fayetteville, Arkansas	New York, New York	Yakima, Washington
Gainesville, Florida	Orlando, Florida	

Field Offices

Riverside, California

Sacramento, California

1. Deciduous Fruit Investigations.--These investigations concern production problems, improvement by breeding and selection and disease control of the more or less hardy deciduous tree fruits such as the apple, pear, peach, cherry, plum, apricot; berry fruits, such as the raspberry, blackberry, dewberry, strawberry, currant, gooseberry, cranberry; also grapes, and other cold- or moderately cold-resistant tree and small fruits. Most of these fruits are widely grown; with few exceptions they are produced to a greater or less extent practically throughout the country, other than in the subtropical areas in Florida, southern Texas, Arizona, and California. The relationships are studied of soil improvement crops, use of plant foods, pruning, fruit thinning, irrigation, and other management practices on fruit bud formation, regularity of crop, and the eating, culinary, shipping, and storage quality of the products, as are also the interrelationships of these various practices. Correlation studies are made of leaf area in relation to fruit bud differentiation and size of crop and regularity of production. Through breeding, more useful and more profitable varieties of the different fruits are developed, selections being based on better eating quality, larger yields more regularly produced, greater resistance to diseases and insects, cold and drought, and better adaptation to particular regions or conditions. Through bud selection also, some of these objectives may be secured. The adaptability and merit of new or little known fruit varieties to diverse conditions are studied. Grape rootstocks resistant to the phylloxera and to the nema, and which are adapted to different soils and climates and congenial with different varieties, especially in vinifera grape regions, are investigated. The fungus, bacterial, virus and physiological diseases of these fruits are studied for the purpose of determining their life histories, methods of dissemination, and means of infecting their hosts, in order to work out the most effective and practicable means of control. Some diseases are best controlled through the development by breeding of resistant varieties or strains. The development of new fungicides of greater effectiveness, and non-injurious to crop plants is given concrete consideration.

The aim of these investigations is to aid the grower in reducing costs of production, relatively or actually, thereby making fruit growing more profitable and at the same time provide the consumer with more satisfactory and more appealing fruits of superior quality, which will command, as a result, better prices.

Very great investments are represented by the fruits included under this project. The land involved comprises an estimated four to five million acres for the tree fruits and grapes only, and not including 164,000 to

185,000 acres devoted annually to strawberries, and thousands of acres to raspberries and other small fruits, for which no data are available. The value of the land is but a fraction of the investment, since the trees must be planted and cared for from three or four to ten or more years, depending on the kind of fruit, before a crop that will more than pay orchard maintenance and overhead costs can be expected. Orchard implements, packing houses with their equipment of sizing machines, washing machines, packing tables, and the like must be provided, unless a central or community packing house is available, which will usually reduce packing costs somewhat to the individual grower. Further the annual investment in producing, harvesting, and packing the crop, before any seasonal returns are received, may be as much as 75 cents per bushel, or even more in some cases, for apples. This does not include merchandizing and shipping costs.

Apple production during recent years has varied from about 117,000,000 to more than 210,000,000 bushels annually, with farm values varying in different years from less than \$112,000,000 to nearly \$147,000,000 depending on the size of the crop and prices received. The peach crop has varied in recent years from about 45,000,000 to nearly 60,000,000 bushels, the farm value of which ranged from approximately \$33,000,000 to well over \$60,000,000 annually. The pear crop averages around 26,000,000 bushels, valued at the farm at about \$17,000,000 with a high annual value of nearly \$20,000,000. The grape crop year by year, has an average annual value on the farm of some \$41,400,000. The value to the growers of the strawberry crop has varied in the past few years from a low of less than \$20,000,000 to a maximum of nearly \$36,000,000. The other fruits in the group named above represent smaller values, but the aggregate adds many millions of dollars to the total.

Enormous losses are suffered annually from fruit diseases. The best available estimates for some of these losses, based on averages for the years 1934-38 inclusive are: For apples, 15,000,000 bu., volume equal to 10 percent of the crop; pears, 1,500,000 bu., equal to about 6 percent of the crop; peaches, 10 percent, or 5,100,000 bu.; strawberries, nearly 14 percent, or about 1,600,000 crates; grapes east of the Rocky Mountains, about 11 percent of the crop. These losses are experienced even with the expenditure of many millions of dollars annually by fruit growers in the application of control measures. More effective fungicides that are less toxic to the host plants are much needed; research in the development of such fungicides is in progress. The development of desirable varieties highly resistant to the various diseases would also greatly relieve the growers. One of the serious economic aspects of fruit growing is the wide fluctuation in size of the crops from year to year. The research activities are planned with a view to reducing the hazards, so far as they are controllable, that are responsible for these fluctuations, to the end that the results of the growers' efforts may be more dependable. The average annual value of the crops in this group of fruit reaches the sum of \$300,000,000, and in certain favorable years, the amount is much larger than this figure.

2. Citrus, Avocado, and Other Subtropical Fruit Investigations.--

The investigations under this project concern the orange, grapefruit, lemon, avocado, date, olive, fig, mango, papaya, pineapple, and other fruits of lesser importance that are adapted to the subtropical sections of Florida, Lower Rio Grande Valley region of Texas, parts of Arizona and California, and to other suitable areas in the Gulf Coast region. The production problems are basically the same as those relating to deciduous fruits and have to do with methods of soil maintenance; use of different fertilizers and their effects on quality and character of the fruit; pruning, irrigation; breeding and selection to obtain superior varieties; disease control; propagation problems; and the physiology of growth and development of fruits under subtropical conditions.

Citrus production has increased rapidly in recent years. The number of orange trees advanced from 31,900,000 trees in 1930 to 38,900,000 in 1935. Of the latter 33,100,000 were in bearing. In July 1938 there were estimated to be 37,800,000 in bearing. About 44 percent of these were from 5 to 15 years of age; about 23 percent of that group were 5 to 10 years old--which forecasts greatly increased crops as these trees come into full bearing. From 1930-31 to 1936-37 the crop ranged from 47,000,000 to about 64,000,000 boxes; the preliminary estimate for 1937-38 is 73,800,000 boxes. The trend of world production is definitely upward. The farm value of the orange crop in both 1935-36 and 1936-37 was in excess of \$100,000,000 each year.

A survey of grapefruit groves as of July 1938 indicates 13,100,000 bearing trees in Florida, Texas, Arizona, and California; two-thirds of which were from 5 to 15 years of age, and therefore not in full bearing. Forty-five percent of this age group were from 5 to 10 years old. The crops for 1936-37 and 1937-38 amounted to about 30,400,000 boxes each--which were over 9,000,000 boxes more than any previous crop. The estimate for the 1938-39 crop is 40,700,000 boxes. In view of the large number of young grapefruit trees not yet in full bearing, still larger production is in prospect. The farm value of the crop in 1935-36 was about \$24,400,000 which was somewhat more than \$2,000,000 greater than in 1936-37.

Commercial lemon growing is practically restricted in this country to California. In 1930 there were in that State 309,000 trees not of bearing age and 2,776,000 of bearing age. On an area basis there were in July 1938, in California, about 51,500 acres in bearing lemon trees, an increase of 4,400 acres since July 1937. Of the total, 31,000 or 60 percent consist of trees 16 years old or more; 20,500 trees, 5 to 15 years of age. The estimate of the 1938-39 crop is 8,550,000 boxes with a farm value of \$22,658,000. The farm value of the 1936-37 crop was \$25,521,000, which was about \$800,000 more than reported for the previous year (1935-36).

Commercial lime growing is practically restricted in this country to Florida, and production has increased very rapidly since 1930. In 1930 there were in the State 15,430 trees not of bearing age, and 42,294 of bearing age.

Although no recent acreage data are available, there is a record of lime trees sold by Florida nurseries which shows that more than 340,000 lime trees were planted in Florida between 1930 and 1937. A large number of these trees are not yet in full bearing, and a still larger production of limes is in prospect. The estimate of the 1937-38 crop was 95,000 boxes, which was 25,000 boxes more than the previous year. The estimated farm value of the 1937-38 crop was \$385,000, which was an increase of \$223,000 over the previous year.

The avocado is grown in Florida and California. Preliminary estimates for the crop in 1937 were 4,200,000 pounds in Florida, having a farm value of \$200,000; in California, 9,800,000 pounds with a farm value of \$808,000. In Florida the area in 1938 was estimated at more than 3,000 acres, or a total of 210,000 trees, of which practically all were in bearing. The area in California in 1936 was estimated at more than 14,000 acres, a total of nearly 1,200,000 trees, of which about 3,900 acres were not of bearing age.

Commercial fig production is confined to California and Texas. Production in California in 1937 was estimated at 29,500 tons (dry basis) of dried figs, with a farm value of \$2,006,000, and 10,000 tons (fresh basis) of fresh and canned figs with a farm value of \$699,000. The production has been gradually increasing since 1932 when 19,000 tons (dry basis) of dried figs and 6,500 tons (fresh basis) of fresh and canning figs were produced. In Texas the production of preserving figs was estimated at 1,610 tons (fresh basis) in 1937, with a farm value of \$97,000, and production has been gradually increasing since 1932, when 510 tons (fresh basis) of canning figs were produced.

The olive is practically restricted to California, with a very small production in Arizona. Nearly 26,000 acres are devoted to this fruit in California. The crop for 1937 was estimated at 25,000 tons, which was 2,000 tons less than in 1935. The farm value in 1937 was \$1,878,000, which was \$284,000 more than the value of the larger crop in 1935.

Dates are of commercial importance in California mainly, but with a relatively small production in Arizona, for which no recent data are available. Production in California in 1937 was estimated at 7,160,000 pounds, having a farm value of \$430,000. This yield was 780,000 pounds less than in 1936, the yield that year being the largest on record. The general trend of production however, has been steadily upward, the first crop to exceed 2,000,000 pounds being in 1930. This industry has developed largely on the basis of the results of research by this Bureau. The most of the present lines of research under this project as now organized have been in progress for only comparatively short periods, but constructive progress towards highly valuable results have been made.

3. Nut Investigations.--The research work under this project concerns principally the nuts grown commercially in the United States; the pecan, mainly in the central and south Atlantic and Gulf States and certain adjacent areas in

the Mississippi Valley, westward to central Texas and central Oklahoma and southern Arizona, southern California; the tung nut in the Gulf States and southern Georgia; the almond in California; the Persian walnut in the Pacific Coast States; the filbert in the Pacific Northwest; the various hickories, black walnut, chestnut, hazel, and various other nuts in the Northeastern States; although interest in some of these nuts extends to other states in the East and North. Basically the problems are similar to those relating to deciduous and subtropical fruits and include planting methods, cultural requirements, influence of cover crops, relation of plant foods to tree performance, irrigation, pollination requirements, breeding, disease control, and other practices which have to do with improving regularity, quality, and size of crop. Information relative to the keeping quality of different varieties of nuts should result in more profitable returns. However, the production problems relating to the different nuts are very diverse.

The pecan is the only native nut of large commercial importance. Its habitat is largely in river bottoms from Iowa and Indiana south to and including much of Texas and Louisiana. However, the most extensive orchard plantings are on upland in the southern parts of Mississippi, Alabama, and Georgia, northern Florida and in South Carolina. Quite extensive plantings have also been made in Louisiana and Texas within the native habitat of the species. These orchard plantings representing heavy investments have proved financially disastrous in many cases because of unproductiveness, disease, and other causes. Substantial progress has been made in recent years through research in overcoming some of the most serious troubles, with the result that many orchards formerly unproductive are now producing profitable crops. The tung tree is a species introduced into this country from China in 1905 in the form of nuts. While the first trees were planted thirty years or more ago, few orchards are more than ten to fifteen years old. The most rapid expansion in orchard planting has occurred during the past 5 years. The extent of present plantings is estimated at around 120,000 acres. Only seedling trees have been available for planting. Such trees are known to vary greatly in productiveness of nuts and in yield of oil. Comparatively little is known of soil or cultural requirements, effects of fertilizers or other treatment on yield or quality of oil; little is known about propagation, or the possibilities of improving production and quality of oil either through selection of the best seedling strains or the development of improved varieties through breeding. The investigations initiated under the appropriation for tung investigations for the fiscal year 1939 are designed to develop the much needed information. The establishment of a successful and profitable tung oil industry would furnish much of the 175,000,000 pounds imported annually. As yet, however, the profitable production of tung oil in this country awaits demonstration. In California, the almond presented serious problems in merchandizing because of the great number of varieties grown and the consequent difficulty of establishing satisfactory grades. A comprehensive study of the merits of the different varieties made it possible to eliminate the inferior sorts and to substitute therefor the better varieties. As a result of the breeding work, two new varieties of superior merit have just been introduced.

One of these in particular possesses such high merit that it is believed it will rapidly supplant many other varieties and add thousands of dollars to the growers' income. On the Pacific Coast, many thousands of Persian walnut trees had regularly been unproductive, not yielding sufficient returns to pay operating expenses. By investigating pollination requirements, and subsequently the adoption of pollination methods developed as a result, these same trees became profitable producers. Serious problems in filbert production and disease control confront the growers in the Northwest. These are gradually being worked out through investigations now in progress. Nut growing in the Northeastern States is not at present impressive from a commercial standpoint, but potential possibilities of considerable importance are recognized. The investigations stress the selection of hickory and black walnut trees growing in the wild which bear nuts of superior quality, the breeding of hazels of high merit adapted to this region, and the study of Oriental and other chestnuts with a view to making selections which produce nuts of desirable quality, also breeding for improvement. Information relative to the keeping qualities of different varieties of nuts should result in more profitable returns.

The increasing importance of nuts in the diet is recognized. The extent of the nut industry of the country is indicated as follows: The pecan crop has varied in recent years from about 40,000,000 to more than 80,000,000 pounds, with the very high maximum crop in 1935 of nearly 106,000,000 pounds. This extremely large crop was due to the unprecedentedly high yield of seedling trees in the wild. For the three years 1935 to 1937 the yield of improved varieties (orchard plantings) has varied from about 19,000,000 to nearly 23,000,000 pounds. The farm value of all pecans during the same three years ranged from \$4,800,000 to \$6,700,000; as an average the value of the improved varieties has been about 45 percent of the total. The almond crop in California varies widely. In 1935 it was 9,300 tons; price per ton on the farm \$280. In 1936 it was 7,600 tons, price \$402 per ton; preliminary estimate for 1937 was 17,000 tons, price per ton \$275. The Persian walnut crop in California in 1937, preliminary estimate was 57,000 tons with a farm value of \$9,975,000; for Oregon, 2,100 tons valued at \$472,000. The yield in California was appreciably larger than any previous crop of record. In Oregon the 1936 crop was only 1400 tons, but in 1935, it was 3,200 tons, thus indicating high variable annual production. The filbert crop in Oregon was 2,230 tons (preliminary estimate) in 1937, with a value of \$479,000, while a crop of 1,850 tons in 1936 was valued at \$500,000. Since practically all tung orchards are young and not yet in bearing the amount of oil produced has been low. In 1936 approximately 2,000,000 pounds of oil was produced, in 1937 the crop was destroyed by a late spring freeze and it is now estimated that the 1938 crop will be from 4,000,000 to 5,000,000 pounds.

4. Vegetable Investigations.-- Under this project is grouped a wide range of research problems that concern, to a greater or less extent, most of the vegetables that are important to the commercial grower and to the home gardener. Most vegetables are grown from seeds; therefore, wide variations in different seed stocks of the same variety inevitably develop. Results of studies on varietal standardization and maintenance of standards have been

published for some crops and others are in progress. Studies are being conducted on the factors affecting the development and the culinary and market quality of vegetables; the adaptability of different kinds and varieties to cold and drought conditions and to other environmental conditions; longevity of different vegetable seeds under different storage conditions and how to preserve high viability; cytology and genetics of different vegetables with particular reference to inheritance of factors for high quality and resistance to diseases. Extensive breeding investigations are in progress for the development of improved varieties better adapted to diverse conditions of growth and better suited to particular purposes and resistant to disease, the latter in many cases being the only effective means by which certain diseases can be controlled; the fungus, virus, and bacterial diseases of the cabbage and other crucifers, tomato, bean, cucumber, cantaloup, watermelon, pea, celery, sweetpotato, onion, peanut, and other truck crops are being extensively studied to determine the nature of the causal agent, how it is carried over, methods of dissemination and infection, and other facts necessary to consider in developing and in applying effective control measures. Physiological diseases are also being studied. Many of the disease problems are regional, the same vegetable being subject to different devastating diseases in different parts of the country, while others are national in scope. In several sections of the South great quantities of tomato, cabbage and other vegetable plants commonly started in seedbeds and later transplanted to the field by individual farmers are produced and shipped to truck growers and home gardeners throughout a large part of the country. Such seedbeds have heretofore become infected with disease and the distribution of the plants has been a means of wide dissemination of devastating diseases. Investigations aimed to the control of such diseases at their source are in progress.

A program of sweetpotato breeding and selection, and cultural and growth studies is in progress.

Losses from diseases of truck crops are difficult to appraise. The following figures give the average estimated percentage and volume of reduction of a few crops for a period of years:

	<u>Average</u> <u>percent 1931-1936</u>	<u>Average</u> <u>Volume Reduction</u>
Sweetpotatoes	9.3	4,420,000 bu.
Tomatoes (for manufacture).	12.5	145,300 tons
Tomatoes (for market)	16.2	2,280,000 bu.
	<u>Average</u> <u>percent 1934-1936</u>	
Snap beans (for manufacture)	5.4	2,720 tons
Snap beans (for market).....	16.9	1,860,000 bu.
Green peas (for manufacture)	5.7	9,240 tons
Green peas (for market).....	8.7	330,000 bu.

Losses from disease vary widely in different seasons and in different regions. For instance, in 1935 the loss in green peas for market was only 4.1% but in 1936 it was 16.6%. Undoubtedly, losses from diseases in some vegetables are much greater than those indicated above, notwithstanding the wide application of the generally approved methods of control. In case of certain vegetables disease losses have been reduced through the planting of recently introduced varieties having high disease resistance.

The extent of the truck crop industry is indicated by the fact that in 1937 about 4,000,000 acres were devoted to such crops, which was about 180,000 acres more than in 1936, including crops grown for marketing in the fresh state and those for storage, canning, and manufacturing. The cash income for all truck crops, exclusive of white potatoes but including sweet-potatoes, in 1936 was over \$375,000,000, and in 1937 more than \$415,000,000.

Some of the accomplishments of research have been (1) the virtual saving of the lettuce industry of Southern California (farm value \$5,000,000 annually) and adjacent areas through the breeding of varieties resistant to certain destructive diseases. (2) The same is true of the cantaloup industry of the Imperial Valley from which 5,380,000 crates, worth about \$7,000,000, were shipped in 1937, the product of 29,890 acres of land, practically all of which was planted to a disease resistant variety that was developed in our breeding work. (3) The development of tomato varieties resistant to certain destructive diseases has made possible the profitable continuing of tomato growing in certain areas, especially the Middle Atlantic and Southeastern States. (4) The development of cabbage varieties resistant to "cabbage yellows" has saved thousands of dollars to the industry. (5) Superior varieties of snap beans, lima beans, and lettuce for the East as well as for the Southwest and other introductions as a result of vegetable breeding work are typical of the returns from research under this project. (6) Studies of a serious virus disease of celery in Florida developed the fact that the insect vector lived over winter in certain weeds commonly found growing in areas adjacent to the celery field. The simple expedient of freeing those areas of these weeds practically eliminated the celery disease. (7) The development by selection of high yielding strains of both Spanish and fancy large-seeded Virginia peanuts has made possible greatly increased per acre yields of this crop, and with 1,650,000 acres or more planted annually and the crop worth more than \$30,000,000 on the farm, the increased yields become significant. The large-seeded forms also bring a premium for their large size.

5. Floricultural and Ornamental Horticultural Plant Investigations.-- The investigations under this project pertain to ornamental plants, including florists' stocks, flowering bulbs, in great variety, annual and hardy herbaceous species, shrubs for home ground and public planting, and trees for shade, street and park plantings, and for other decorative purposes. The work includes cultural studies, breeding for the development of superior varieties, storage and handling of the various stocks, studies of the anatomy and physiological

processes that take place in bulbs such as the tulip and narcissus when differently handled and stored, the object being to correlate particular storage treatment with results of same on time of flowering and quality of the product; genetic studies are in progress to determine inheritance of certain essential plant and blossom characteristics such as flower doubleness, color, size and time of bloom, and plant habit. Much attention has been given in past years to the testing of a great number of varieties of roses to determine their range of adaptability and merit when grown under different conditions; the use is studied of shrubbery and other plants in the ornamentation of home grounds and other landscaping purposes. The cultural information with bulbs is primarily for the purpose of developing information needed for their successful production for the trade under American conditions, the supplies of many of the more popular bulbs being imported from European and other countries. Plant food requirements, soil adaptations, and other cultural requirements of flowering bulbs and other plants are studied.

The nature, life histories, means of dissemination and methods of control of many diseases of ornamental plants are studied. Particular attention is being given to diseases of flowering bulbs, roses, a devastating disease of azalea blossoms, boxwood, florists' stock, and many other ornamental plants. Some of the important results of these investigations include: The development by breeding and the introduction of some 20 superior lily hybrids; a large number, perhaps a hundred other very promising hybrid lily selections are under test; the development by selection of 12 varieties of early flowering, hardy, and otherwise desirable chrysanthemums especially for northern areas where most of the hardy chrysanthemums blossom so late in the season as to be of but little value, and in addition there is a considerable number of more recent selections, some of which are probably superior to those already distributed for propagation; through experiment much information has been developed that is essential to the successful establishment of a bulb production industry in this country, with the result that a great many Dutch and other bulbs formerly imported for domestic use are now being produced in the United States; storage investigations have shown that by proper regulation of conditions, especially temperature, the time of blossoming of certain flowering bulbs can be closely regulated, thus making the blooms available for market when they will command the best prices. The stock, an important florists' plant, grown from seed, develops plants, some of which produce double flowers, others single blossoms, the latter being of little value. A method has been developed of segregating within a very high degree of accuracy these two types of plants in the early seedling stage. Easter lily bulbs used in this country are nearly all imported from Bermuda, and Japan (under normal conditions). The results of investigations indicate that it is entirely practicable to produce adequate supplies of superior Easter lily bulbs in this country. Extensive studies of the diseases of flowering bulbs are yielding results of much value to the grower; the life history of the destructive disease of the azalea flowers in the South has been sufficiently well worked out to make practicable the testing of control measures.

There are no adequate data on the extent of the ornamental plant industry. In 1929 there were imported some 235,000,000 or more bulbs, including hyacinths, tulips, daffodils, and others, valued at nearly \$7,000,000. In 1932 the importations of the same items amounted to 140,000,000 to 150,000,000 bulbs. In 1935, the number was less than 130,000,000. This probably does not signify the use of a reduced number of bulbs, but rather that domestic production supplied an increasingly large proportion of the demand. The 1930 census supplies the most significant data in sales of ornamental stocks. In 1929, the sales of florists' stocks grown in greenhouses such as roses, carnations, and the like amounted in value to more than \$98,000,000, while nursery sales of ornamental trees, shrubs, and other similar plants, not including annuals, herbaceous plants or bulbs, amounted to about 110,000,000 specimens, and on April 1, 1930 there were about 340,000,000 specimens of the same items of all ages growing in the nurseries for future sale. It is believed that the interest of planters in this type of material has increased since the 1930 census figures were compiled.

6. Nursery Stock and Farm Windbreak Investigations.--Broadly, this project deals with the propagation of trees, shrubs, and other plants, including the physiology of vegetative and other plant multiplication processes, conditions under which such processes take place the most satisfactorily, the finding or development of more satisfactory rootstocks for apple, pear, cherry, peach, and other fruits, as well as ornamental shrubs and other plants propagated by budding or grafting. In the study of rootstocks, attention is especially directed to problems of winter hardiness, disease resistance, and congeniality of rootstock and scion or bud variety. Serious and baffling problems in congeniality appear frequently. In the case of some root diseases, the discovery or development of rootstocks resistant to such diseases appears to be the only effective way of control. These problems are being studied. Crown gall, a serious disease of various kinds of rootstocks, is being studied to determine means of dissemination and infection, and practicable methods of effective control, including possibility of so handling bench grafts and other propagations that infection is prevented. Root rot and other diseases of the roots of trees are also being investigated. The use of certain growth promoting substances, or hormones, in plant propagation, especially in the rooting of cuttings, is attracting wide attention, and extensive investigations under this project as to their value and limitations have been carried on. The use is being investigated of trees and other plant material for windbreak purposes, especially in the Great Plains area where living conditions on the farms are made hard because of the severity of the climate and drying effects of much wind. Plant material suited for this purpose and adapted to the peculiar conditions of the region, and its arrangement for supplying the greatest possible protection are phases of the windbreak problem under investigation. Storage problems relating to carrying over winter of fall dug stock for spring deliveries are studied. These concern largely proper temperature and moisture conditions and their maintenance. Research on storage conditions for optimum results should save many thousands of dollars

in such losses. Improvements in methods of disease control will prevent large losses and have a stabilizing effect on the industry. The best selection and proper arrangement of trees for windbreak planting in the Great Plains area should result in better conservation of soil moisture through lessening the effects of drying winds; in the better distribution of soil moisture by preventing the drifting of snow in the winter; in preventing the distortion of fruit trees and other vegetation by breaking the force of strongly prevailing winds; in preventing wind erosion of the soil, and in general, creating more pleasant surroundings in which to live and a more profitable agriculture.

Recent data on the nursery industry are lacking. The special horticultural census of 1930 gives the most informing reflection available. The sales during 1929 amounted to nearly 186,000,000 trees, shrubs, and other plants (excluding strawberry and other berry plants). The sales value of this stock was about \$95,000,000. As of April 1, 1930, nurserymen had growing some 490,000,000 specimens of the same items of all ages. The American Association of Nurserymen, representing many of the important nurseries of the country, but by no means all of them, at its annual meeting in Detroit in July 1938, reported 68,000 acres of nursery stock in its membership, with a total investment of half a billion dollars in nurseries, greenhouses, packing houses, and the like, on which an annual tax of over \$1,000,000 was paid. Relatively little research work directly relating to the nursery problems has been done in this country.

7. Potato Investigations.--- The research work in this project falls into three fields - (1) breeding, (2) cultural, and (3) disease investigations.

(1) Breeding consists in the development of varieties that are resistant to destructive diseases and insects, have superior table qualities, and are adapted to the soil and climate of the different regions. In the National Potato Breeding program, cooperative investigations are conducted with Agricultural Experiment Stations of California, Colorado, Idaho, Iowa, Louisiana, Maine, Michigan, Minnesota, Nebraska, New York, North Carolina, North Dakota, Oregon, Rhode Island, South Carolina, Utah, Washington, and Hawaii. In addition, the Federal Government is conducting work at Beltsville, Maryland; Presque Isle, Maine; Greeley, Colorado; and University, Louisiana. A considerably expanded research program, especially in breeding, is being inaugurated in the South. The work centering in Louisiana is to be gradually expanded.

(2) The investigations on culture include methods of storage and handling of seed potatoes, breaking dormancy, cutting practices, proper spacing of new varieties, methods of handling plants to overcome sterility in the production of true seed such as the supplementary use of artificial light, environmental effects on seed production, and the effect of different amounts of disease on yield.

(3) Diseases caused by fungi, bacteria, viruses and physiological troubles are all given consideration. A study is made of their distribution,

life history, means of dissemination, etc. Work on the so-called degeneration or virus disease is being stressed. A very important feature of the work is in cooperation with the breeding program in testing the various progenies for resistance to a number of diseases.

The economic importance of better means of controlling potato diseases either by developing disease-resistant varieties or the finding of more effective methods of control is expressed in estimates to the effect that the average reduction of the potato crop due to diseases for the years 1931-36 was 18.9 percent of the average crop, the loss amounting to 61,181,000 bushels.

The economic importance of the potato production industry is suggested in the fact that for the years 1934 to 1937, inclusive, the average annual acreage planted was 3,344,500 acres, the largest acreage during these years being 3,597,000 acres in 1934. The average yield for this same period was 378,892,000 bushels; the largest annual yield, 406,105,000 bushels being in 1934. The average annual farm value (1934 to 1937) was \$248,621,000; the highest annual value was \$374,893,000 in 1936. That was also the year of the smallest acreage, and the lowest production for this period (1934-37). Similarly 1934, the year of both largest acreage and highest production, was the year of lowest farm value, \$181,748,000. The preliminary crop estimate for 1938 is 368,203,000 bushels, which is very close to the 10-year average for 1927 to 1936, of 369,693,000 bushels.

8. Methods of Handling, Transportation and Storage, and Market Diseases of Fruits, Vegetables, and Flowers, Investigations of.—Investigations are made to determine: satisfactory indexes of maturity so that fruits and vegetables can be harvested at the stage most desirable for local or distant markets, for shipment in the fresh state or for storage; economical and efficient methods of packing; best methods of precooling to retard ripening in transit or to enable ripener and better quality fruits and vegetables to be shipped; the most effective and economical methods of refrigerating shipments by rail, truck or boat to domestic and foreign markets; the most satisfactory methods of protecting shipments from freezing in transit without supplying so much heat that the products will become overripe; methods of conditioning perishable products for market prior to shipment, including use of ethylene to cause degreening of citrus fruit, use of antiseptic or disinfectant washes or fumigants to kill decay organisms, methods of removing excessive spray residues or otherwise satisfactorily cleansing the products. Experiments are conducted on gas treatments prior to or during storage and transportation as a supplement to or substitute for refrigeration. Diseases of fruits, vegetables and florists' stocks occurring during storage, transit or after arrival on the market are investigated and methods of control are developed. Special emphasis is placed on investigations of the storage and transportation requirements as to temperature, humidity, and aeration or ventilation and practical length of storage as well as ripening conditions thereafter for fresh products intended for market, or for local consumption.

Various other post-harvest problems of perishable horticultural products are being investigated. As a result, the practical storage period for various products has been greatly extended and a greater latitude established for the marketing of some products while at the same time methods of handling other products have been so improved that excellent quality has been obtained from types previously regarded as inferior and unprofitable.

These investigations have resulted in the development of methods which save the industry many millions of dollars annually. The method of controlling apple scald by use of oiled wraps or shredded oiled paper, which was developed under these activities, alone is estimated to save upwards of \$2,000,000 annually. The saving in transit refrigeration costs to the California and Arizona citrus industry through adoption of more economical methods of icing cars en route developed in the Bureau's investigations likewise has resulted in an annual saving of upwards of \$1,000,000. Savings to pear shippers of the Pacific Coast due to adoption of precooling, heavier loading, and transit refrigeration methods worked out by the Bureau are also estimated to total fully \$1,000,000 annually. The reduction in losses from stem-end rot and other decays of Florida citrus fruit due to adoption of the improved methods of harvesting and disinfection developed by the Bureau amounts to several hundred thousand dollars a year. Most recently work conducted under this authority has opened the way for savings of at least 20 percent of the value of the Puerto Rico pineapple crop through development of a treatment to control black rot which ordinarily causes very heavy losses. Losses similarly due to diseases which attack perishables after harvest, whether in transit, in storage, or on the market, and from freezing, overheating or other adverse physical conditions total many millions of dollars annually, which must be shared by producers (in reduced returns) and by consumers (in increased costs). The work done in this Section is directed specifically at the reduction of these losses. While it is possible to estimate and enumerate specific savings totalling many times the annual cost of the work as already illustrated in the items cited, it is impossible to estimate the additional savings and benefits to the industry which flow from the many other investigations conducted in this Section, resulting particularly from the improvement in handling, storage, and transportation practices for many products, and the development of safe methods of cleansing fruits and vegetables from objectionable spray residues so that they can move freely to both domestic and foreign markets (at one time market outlets for these products were seriously threatened on this account). In the eastern and southern parts of the country where prevalence of pear blight makes it impossible to grow better varieties of pears, the Kieffer, Pineapple and other varieties of this type can be grown but because of their hard woody texture as ordinarily handled they are not greatly prized and usually bring poor returns when sold. Methods of ripening these pears so that they lose their hard woody texture have been developed in this work, thus opening the way for satisfactorily marketing them, and greatly increasing the satisfaction with which they can be consumed in the homes of thousands of people who depend upon them for their own fresh fruit needs.

(n) GENETICS AND BIOPHYSICS

Appropriation Act, 1940	: \$31,675
Budget Estimate, 1941	: <u>31,675</u>

PROJECT STATEMENT

Projects	:	:	:
	:	1939 :: 1940	:
	:	:	1941
	:	:(Estimated)	:(Estimated)
Genetics and biophysics investigations	:	:	:
Unobligated balance	:	\$31,419: \$31,675	:
	:	256: - - -	:
Total appropriation	:	:	:
	:	31,675: 31,675	:
	:	:	:

WORK UNDER THIS APPROPRIATION

The work under this appropriation includes studies chiefly with corn and its wild relatives, of the mechanism of inheritance, by which plant characters are transmitted from one generation to the next; exploration of the possibilities of inducing new characters by various kinds of radiation, such as X-rays, heat, and light; and investigation of the possibility of influencing the growth of plants by modifying certain elements of the environment, with special reference to X-rays and to light of specified wave lengths or colors. The investigations are carried on in the laboratory and at field stations operated by other divisions of the Bureau.

The justification for this work lies in the importance of a thorough knowledge of the mode and the mechanism of inheritance as a guide to the improvement of plants by breeding, of producing entirely new forms of plants that might have useful characters, and of determining the action on plant growth of electrical, photoelectrical, and other radiations. The results achieved in previous years have made valuable contributions to a knowledge of heredity of importance to an understanding of plant breeding. Results have been obtained on the effect of light of different wave lengths on the growth of corn and other seedlings.

(o) IRRIGATION AGRICULTURE

Appropriation Act, 1940	\$152,674
Budget Estimate, 1941	125,120
Decrease	<u>27,554</u>

PROJECT STATEMENT

Projects	: 1939	: 1940	: 1941	: Increase or Decrease
		:(Estimated)	:(Estimated)	
1. Crop production investi-	:	:	:	:
gations under irrigation	\$120,772	\$122,077	\$94,403	-\$27,674 (1)
2. Quality of irrigation and	:	:	:	:
drainage waters	30,581	30,597	30,597	- - -
Additional for administrative	:	:	:	:
promotions	- - -	- - -	120	+ 120 (2)
Unobligated balance.	1,321	- - -	- - -	- - -
Total appropriation	152,674	152,674	125,120	- 27,554

INCREASE AND DECREASE

The net decrease of \$27,554 in this item for 1941 consists of:

(1) A reduction of \$27,674 under project "Crop production investigations under irrigation". This reduction contemplates the discontinuance of the cooperative field station at Hermiston, Oregon, discontinuance of the Federal field station at Bard, California, reduction in the cooperative irrigation work at Scotts Bluff, Nebraska, reduction in the citrus irrigation investigations in California, and general crop studies in Maryland.

This reduction contemplates discontinuing the services of the following personnel:

Field:

- 1- P-5 Associate Agronomist
- 1- SP-7 Principal Scientific Aid
- 1- SF-6 Field Assistant
- 2- Agents
- 9- Laborers
- 1- Caretaker
- 10 to 15 temporary employees

The distribution of the reduction by geographic divisions would be as follows:

California	\$15,480
Maryland	2,920
Nebraska	1,200
Oregon	8,074
	<u>\$27,674</u>

(2) \$120 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.-- Under this appropriation the Bureau of Plant Industry is conducting investigations, independently and in cooperation with State Experiment Stations and agencies and with other Bureaus and Departments of the Government, in the irrigated areas of the United States to determine what crops, what crop rotations and what irrigation methods are best suited to the several regions, what constituents and concentrations of salts in irrigation and subsoil waters are injurious to crops, and how such injury may be minimized or prevented.

1. Crop Production Investigations Under Irrigation.-- The work under this project is carried on at field stations of the Bureau and in cooperation with State Agricultural Experiment Stations and with private growers. The work consists of investigations with field, vegetable, and fruit crops, an extensive series of crop rotation experiments, investigations of irrigation methods, of the water requirements of crops, and of the use of manures and fertilizers as a means of maintaining crop yields. The fundamental objective of these investigations and experiments is to determine what methods of irrigation, of crop production, and of crop utilization on the farm are best adapted to the maintenance of a permanently successful irrigated agriculture.

2. Quality of Irrigation and Drainage Waters.-- The work under this project is conducted at field laboratories - one at Riverside, California, and one at Fallon, Nevada, and in cooperation with the States, with the Bureau of Reclamation, the Geological Survey, the International Boundary Commission (United States and Mexico), and with various irrigation districts. The investigational work consists of collecting and analyzing samples of irrigation, drainage, and underground waters to determine what constituents and what concentrations of these constituents are causing crop injury or impairing the physical conditions of the soil, to determine the sources of the contamination of irrigation supplies with such highly injurious substances as the compounds of boron and chlorine, and to devise ways of minimizing or preventing such contamination. The fundamental objective of these investigations is to find ways and means of preventing the injury that may occur in irrigated areas through the accumulation of excessive sub-soil water or of soluble salts in the soil.

(p) MYCOLOGY AND DISEASE SURVEY

Appropriation Act, 1940	\$45,818
Budget Estimate, 1941	46,998
Increase	<u>\$ 1,180</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. Investigations, identification, and collection of fungi.	\$15,953	\$16,029	\$16,029	---
2. Plant disease survey.	22,016	22,263	22,263	---
3. Mushroom investigations	7,389	7,526	7,526	---
Additional for administrative promotions	- - -	- - -	1,180	+\$1,180(1)
Unobligated balance.	460	- - -	- - -	---
Total appropriation.	45,818	45,818	46,998	+ 1,180

INCREASE

(1) \$1,180 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--Research under this appropriation includes the collection and study of plant parasites and other fungi, surveys of plant diseases in the United States, and investigations on the culture and diseases of mushrooms.

1. Investigations, Identification, and Collection of Fungi.--The function of this project is the identification of fungi both beneficial and harmful to man, together with the building up and the maintenance of the necessary collections and the prosecution of the investigations essential to this work. Roughly, 100,000 species of these microscopic members of the plant kingdom are known and new ones are constantly being discovered so that the work of identification is highly specialized and technical. Fungi play an essential role in the fertility of the soil, find numerous applications in industry, function as agents of decay of foods, fibers, forage and provender, forest products, and organic material of all kinds. They cause diseases of plants, insects, domestic and wild animals, and of man. Some of the higher forms are themselves edible while others are employed under controlled conditions in the preparation of foods, beverages, and condiments, and in numerous industrial processes. It is the function

of this project to serve the specialists of the Federal Government, State Experiment Stations, research foundations, educational institutions, and the public with authentic identifications of fungus specimens, and to act as consultant in all matters relating to the classification and relationships of fungi.

An herbarium of world fungi is maintained and in constant use under this project as an essential working collection indispensable in the accurate and authoritative determination of specimens submitted for identification. It included as of December 1938, in excess of 400000 specimens, with supplementary collections of microscopic preparations, photographs, and necessary covering indexes, and is one of the most comprehensive of its kind in the world. Not included in this inventory are some 37,500 specimens awaiting identification.

2. Plant Disease Survey.--This project is organized on a cooperative basis with each of the agricultural colleges and Experiment Stations of the country so as to utilize the voluntary services of approximately 200 official collaborators serving without pay, and 100 or more additional cooperators who also contribute their services. Its function is to gather and to supply to Extension Agents, State Experiment Station Workers, horticulturists, agronomists, plant pathologists, and other specialists, and through them the farmers of the country, useful current information regarding the approach and development of plant disease outbreaks; to collect, distribute, and preserve in permanent files for future use, records of plant disease occurrences; to study the conditions which influence disease development and spread, and in general to act as a national clearing house on the incidence of plant diseases. It is the only agency in the United States that systematically attempts to collect, record, and distribute currently information regarding outbreaks of plant diseases. Twice a month it issues an informal mimeographed publication by means of which its collaborators and various State and Government workers and others interested are kept informed and forewarned regarding crop disease conditions throughout the country.

3. Mushroom Investigations.--This project is concerned with discovering the fundamental principles applying to mushroom culture, and with learning the most practical methods of using these principles for the improvement of cultural practice and disease control. Inasmuch as the mushroom is a fungus, its growth is regulated by different basic principles than apply to green plants. Therefore the individual grower has less general precedent to follow than most farmers and there is an urgent need for reliable information to guide him in his efforts to improve cultural practice or to work his way out of difficulties which constantly arise. The project is also concerned with the development of new non-competitive mushroom industries through the introduction of the culture of European truffles and Oriental mushrooms.

The cultivated mushroom ranks in annual farm value (\$5,000,000) with cauliflower, cranberries, figs, pecans, spinach, hops, and watermelon. It has considerably higher monetary value than such crops as almonds, lima beans, beets, cucumbers, dates, or olives.

(q) NATIONAL ARBORETUM

Appropriation Act, 1940 \$54,587
 Budget Estimate, 1941 54,587

PROJECT STATEMENT

Projects	1939	1940 :(Estimated):	1941 :(Estimated):
1. <u>National Arboretum:</u>			
(a) Maintenance and operation of Arboretum	\$26,700	\$27,000	\$27,000
(b) Planning, developing and con- struction of Arboretum.	27,033	27,587	27,587
Unobligated balance.	854	- - -	- - -
Total appropriation.	54,587	54,587	54,587

WORK UNDER THIS APPROPRIATION

The National Arboretum was authorized by Congress in an Act approved March 4, 1927 (20 U.S.C. 191-194) for research and education concerning tree and plant life. A total of 395 acres has been purchased and present plans call for the purchase of additional land. The Arboretum in its final development will contain living examples of all species of woody plants suited to outdoor cultivation in this region that will furnish the basis for breeding studies with woody plants and ecological studies, as well as botanical work. It will provide also such library, herbarium, office, greenhouse, and nursery facilities as may be needed to carry out the scientific studies. Under this appropriation routine maintenance operations are conducted on the National Arboretum. A large amount of land still remains to be cleared, and the land already cleared should be prepared for planting. Collection of material now on the ground must be maintained and prepared for planting to prevent their total loss. A nursery for the development of plants for the permanent collections has been developed but is not yet large enough. With the purchase of additional land in 1938, the opening of other areas for nursery plantings has been undertaken. This appropriation covers only bare maintenance of limited propagation work and physical improvements made in the past years, and does not permit progress on plans for substantial development.

(r) NEMATOTOLOGY

Appropriation Act, 1940	\$48,961
Budget Estimate, 1941	49,161
Increase	<u>\$ 200</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. Nematology investigations:				
(a) Plant-parasitic and related nematode investigations.	\$46,031	\$46,761	\$46,761	---
(b) Investigations on nemie parasites of insects and other invertebrates:	2,200	2,200	2,200	---
Additional for administrative promotions.	- - -	- - -	200	+ \$200 (1)
Unobligated balance	730	- - -	- - -	---
Total appropriation	48,961	48,961	49,161	+ \$200

INCREASE

(1) \$200 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--About 95% of this appropriation is applied to the study of nematode diseases of plants and related problems; the rest supports investigations concerning nematode parasites of insects and similar invertebrates particularly in respect to their significance as natural controlling factors of insect pests (grasshopper, Japanese beetle, corn earworm, bark beetle, etc.). It is not possible to express in exact figures the toll that this country pays annually to nemie plant pests, since exact surveys of this kind are not practical. Because of the microscopic size of these nematodes attacking plants, and their underground habitat, the damage caused by them is very often attributed to other agents. It is a matter of record, however, that in 1937 the Inspection Service of the State of California condemned 360 shipments because of nematode infestation, 337 alone because of the root-knot nematode. In another year the value of shipments so condemned by the same State was estimated at \$100,000.00. If losses are proportionate in other states, the total annual loss to this country by plant-infesting nematodes is very great. Three agencies of the

Federal Government deal with nematodes: (a) The National Institute of Health, with human parasites; (b) the Zoological Division of the Bureau of Animal Industry, with nematode parasites of domesticated animals and vertebrates; and (c) the Division of Nematology, Bureau of Plant Industry, with plant-parasitic forms, with free-living species of the soil (including those of the fresh and marine water), and with parasites of insects and other invertebrates. The forms parasitic in man and vertebrate animals belong to the same systematic groups, which however are sharply separated from those parasitic in invertebrates, in plants and living free. This situation precludes overlapping of the work of this Division upon that of the other two agencies. The number of economically important nematode diseases of plants is considerable; almost all plant species seem to be subject to some type of nematode disease; roots, stems, buds, leaves, flowers, fruits, or seeds may be attacked.

(a) Plant-parasitic and related nematode investigations:

The root-knot nematode. This is the worst nemie plant disease of all and is known to affect some 1,400 various plant species, including many of our most important crop and horticultural plants. It occurs the world over, particularly in warmer regions and is a dreaded greenhouse pest in all temperate climates. In this country it is considered the worst agricultural pest where sandy soils prevail and climatic conditions are optimal (South Atlantic and Gulf States, Alabama, Tennessee, Mississippi, Arkansas, New Mexico, Arizona, and California). It is said to have occurred in this country as early as the beginning of the last century. This Department published its first bulletin on root-knot in 1889. Damage by this pest, however, has continually increased and amounts to millions of dollars. Lack of knowledge as to the nature of this disease, disregard of sanitary methods as means of prevention, and unscrupulous distribution of infested plant material are the main reasons for this situation. In 1936 a first root-knot nematode conference was called by various private, State, and Federal agencies (Nashville, Tenn.) to review the situation, to organize and coordinate fundamental and control research, and to discuss results and new lines of investigation. Its attendance and proceedings so justified the conference that it was repeated in 1937 (Atlanta, Ga.) and future conferences are planned at annual or biennial intervals, as the need may be. It was agreed that this Division should work on the more fundamental parts of the problem and those matters requiring a specialist, whereas the other agencies should concentrate on local phases and matters more within the scope of the general plant pathologist, the agronomist (best local rotation methods for control), the breeder (breeding of resistant varieties), etc. The activities of this Division in regard to the root-knot nematode problems therefore at present cover the following:

(1) Studies on chemical control covering the soil as well as the host plant. Important basic results of work of the present season are as follows: General identification of the protective cover of these nematodes as a cholesterol. This in turn limits chemicals to be tested as nematocides to those having the property to dissolve or penetrate this cover under given physical conditions such as moisture, temperature, etc. Of some forty chemicals so tested, mesityl oxide, butyraldehyde and crotonaldehyde were found promising for future greenhouse and field tests (Biochemic Division,

Bureau of Animal Industry, cooperating in advisory capacity, and the Division of Foreign Plant Quarantine, Bureau of Entomology and Plant Quarantine, in supplying certain infested material). Field tests on effectiveness and best mode of application of chlorpicrin, carbon disulfide, calcium cyanamide, etc., are conducted at Tifton, Ga., in cooperation with the Georgia Coastal Plain Experiment Station, at Klamath Falls, Oregon, involving Irish potatoes, in cooperation with the Oregon Agricultural Experiment Station, and at Portland, Oregon, in cooperation with private growers. Since uninformed or unscrupulous persons or importers are exploiting materials marked "nematocide," certain tests with such products are conducted (cold smoke root-knot remedy, etc., - all useless) and, at the instigation of the Insecticide Division of the Food and Drug Administration, also an imported Japanese chlorpicrin compound (results negative).

(2) Studies on therapeutic control. Cleaning and curing of infested plants is possible by hot water treatment provided the plant is tolerant to the temperature that kills the nematodes, or also to a chemical added to the water. Here is a wide field of work. Such investigations have now been successfully terminated in regard to tuberoses in cooperation with the Division of Truck Crop and Garden Insect Investigations, Bureau of Entomology and Plant Quarantine (mites are killed, too), the North Carolina Department of Agriculture, and a private grower in Magnolia, N. C. Current work covers freesia bulbs, caladium bulbs, bulbous irises, narcissus, etc., and various nursery stocks such as black locust seedlings, at the request of the State Forester of Arkansas, and the Nursery Division, Soil Conservation Service; vacuum treatments with various chemicals are also studied.

(3) A special study of root-knot under orchard conditions (peach, walnut, tung oil trees, etc.) is in its beginning stage in cooperation with the Georgia Coastal Plain Experiment Station, Tifton, Ga., and growers of the neighboring region.

(4) Crops and ornamentals reported as resistant are tested, some forty different varieties of marigolds giving positive results; likewise zinnias, results negative; a gardenia (Warneria thunbergii) to be used as understock for the very susceptible common species was definitely established as highly resistant.

(5) Since crop rotation is often the most practical method for controlling nematode pests, host lists were published to facilitate rotation planning, and a list of non-hosts and plants more or less resistant is nearly ready for publication.

(6) The effect of alkalinity in soils and its relation to root-knot are being worked on, and similarly many other problems: Host specificity and transfer possibilities of certain populations, the significance of cover crops, of mode of cultivation, of fertilizers, of moisture, of temperature, of soil character, etc., then avenues of distribution, natural enemies, relationship to other diseases (relationship and significance of root-knot and the meadow nematode to cotton wilt, in cooperation with the Division of Cotton and Other Fiber Crops and Diseases, Bureau of Plant Industry, at Luberton, N. C.), therapeutic treatments other than hot water,

nature and causes of nematode resistance in certain plants. Survey observations are made whenever possible.

It is clear that some of these last-mentioned research phases should be classed as major problems requiring the full time of an investigator over a number of years. The discussions at the root-knot conference brought out as most promising and necessary lines for additional work: (a) the breeding of resistant crops, crop varieties and ornamentals; (b) a study of the physical, or chemical, or physiological nature of resistance; and (c) a study of the natural enemies and control factors of this pest. The first problem falls somewhat outside the scope of the work of this Division and the training of its members, and is planned to be carried by other agencies, State and Federal, and divided according to crops. Problems (b) and (c), however, require the work of specialists trained as nematologists and it is thought that this Division of the Federal Government should logically conduct this work. This Department has repeatedly received outside requests for additional work on this pest. The funds at present appropriated were termed as wholly inadequate in relation to the magnitude and significance of the problem (Professor Hyslop, Oregon Agricultural College, Corvallis, Ore.). It has been pointed out that if this pest were new, millions would be mobilized to fight it, but because it is old we resign ourselves to it in a most fatalistic way (Professor Hume, Florida College of Agriculture, Gainesville, Fla.). It has also been pointed out that many fertilizer tests, varietal tests, etc., are worthless because of interference by the root-knot nematode, overlooked by the investigator. Research work in other branches of agriculture thus has been nullified and confused. It can be seen that the character of the two problems necessitates a high standard of training for the persons to be charged with the work. The following lines of new investigation are therefore proposed: (a) a study of resistance in plants to root-knot injury; and (b) a study of natural enemies of the root-knot nematode to determine to what extent these are operating in various soils and to determine if possible how their activity can be increased.

(7) Other work under this project. Other nematode pests of plants similarly worked on are: the bulb or stem nematode known to attack some 300 different species of plants, in this country very detrimental in certain regions to alfalfa, clover, strawberry plants, teasel, onions (State of New York); the bud and leaf nematode, most significant on strawberry plants, chrysanthemums, begonias, ferns; the sugar beet nematode; the wheat nematode and related species infesting grasses (bent grass in Oregon, chewings fescue in Oregon); the citrus nematode; the banana nematode on fig and olive trees in California; the meadow nematode (most widespread and one of the worst and most perplexing forms), and various other forms of lesser significance. Since the soil harbors an endless number of other nematode species often closely associated with plant diseases, activities have to be extended also to this field.

(b) Investigations on nemic parasites of insects and other invertebrates:

Insects and other invertebrates also have their nematode diseases. Their economic significance as natural controlling factors of insect and

similar pests has been evidenced by the results obtained in the control of Japanese beetle grubs in the soil. It is further established that east of the Rocky Mountains, where annual rainfalls permit the occurrence of nematodes, which are nematode parasites of grasshoppers, these latter are never a pest of such magnitude as in the dry regions of the West; there these nematodes are not found. Present work covers these and similar problems.

Since the Division of Nematology is the only agency of its kind in this country, it serves as an information center for State and Federal agencies, growers, and farmers in all these matters, and much time and work are consumed by this service, which covers hundreds of samples and inquiries annually.

(s) PLANT EXPLORATION AND INTRODUCTION

Appropriation Act, 1940:

"Plant Exploration and Introduction"	\$200,933 (a)
"Rubber and Other Tropical Plants"	<u>46,749 (a)</u>
Total available, 1940.	\$247,682
Budget Estimate, 1941.	<u>225,353</u>
Decrease	<u>22,329</u>

(a) The 1941 estimates provide for the consolidation of these items under the title "Plant Exploration and Introduction", with a reduction from \$46,749 to \$23,600 of the Rubber Investigations.

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increases or Decreases
1. <u>Plant Exploration and In-</u>				
<u>troduction:</u>				
(a) Plant exploration and				
collection	\$56,953	\$61,056	\$56,056	:- \$5,000 (1)
(b) Field testing of in-				
troduced plants	167,323	165,718	147,569	:- 18,149 (2)
(c) Plant geography and				
bibliographical investi-				
gations.	20,763	20,908	20,908	- - -
Additional for administrative				
promotions	- - -	- - -	820	+ 820 (3)
Unobligated balance.	2,643	- - -	- - -	- - -
Total appropriation. . .	247,682	247,682	225,353	:- 22,329

INCREASES OR DECREASES

The net decrease of \$22,329 in this item for 1941 consists of:

(1) and (2) A decrease of \$23,149 under work projects (a) and (b) as above. This decrease will involve "a" discontinuing major work in the collection of rubber-producing materials and reducing the collection of other tropical plants; "b" discontinuing most of the rubber work with golden rod at Savannah, Georgia; "c" discontinuing work with Hevea rubber plantings in Florida, except to keep disease free stocks of Hevea now on hand and which may be used elsewhere; and "d" abandoning work with Hevea in the Canal Zone.

This reduction contemplates discontinuing the services of the following personnel:

Departmental:

1- SP-4 Assistant Scientific Aid

Field:

1- P-3 Associate Horticulturist
 1- SP-4 Assistant Scientific Aid
 1- SP-2 Junior Scientific Aid
 2- Farm Laborers

The reduction contemplates the following distribution by geographic divisions:

Departmental.	\$6,329
Canal Zone.	600
Florida	14,480
Georgia	1,740

(3) \$820 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

CHANGES IN LANGUAGE

It is recommended that the language of this paragraph be amended to read as follows:

For investigations in seed and plant introduction, including the study, collection, purchase, testing, propagation, and distribution of rare and valuable seeds, bulbs, trees, shrubs, vines, cuttings, and plants from foreign countries and from our possessions [and] for experiments with reference to their introduction and cultivation in this country, [\$200,933: Provided, That not to exceed \$1,400 of this amount may be expended for the purchase of approximately twenty acres of land to enlarge the United States Plant Introduction Garden at Glenn Dale, Maryland] and for investigation of their diseases, \$225,353.

The first change eliminates authority to purchase land at the United States Plant Introduction Garden at Glenn Dale, Maryland. It is expected that the land referred to will be acquired some time during the current fiscal year.

The second change adds the clause "and for investigations of their diseases", carrying forward authority now contained under the item "Rubber and Other Tropical Plants" which is recommended in the estimates for consolidation with "Plant Exploration and Introduction" in the 1941 estimates. This authority will enable the Department to continue investigations of the diseases of introduced plants.

WORK UNDER THIS APPROPRIATION

General.-- This Division serves as a cooperative and coordinating agency for securing from all parts of the world new, rare, and promising plants that may be useful in the development of new crop industries, directly for the diversification or expansion of economic needs, or as material to be used by plant breeders, especially as related to the development of disease and insect-resistant crops. Initial protection is provided against the introduction of foreign insects and diseases, and preliminary propagation and tests are conducted at four widely separated field stations. Cooperation is maintained with crop specialists in the United States Department of Agriculture, State agricultural colleges and experiment stations, botanic gardens, arboreta, nurserymen, and with selected lists of specially qualified private individuals. Studies are conducted of potential crop plants and of soil and climates of foreign countries as compared with this country, with a view to obtaining materials for introduction most adapted to our needs.

This Division is now generally recognized as the clearing house through which needed plant material is most effectively received. It is also recognized in this country and abroad as the most effective agency in exchanging plant material with foreign research workers, and results obtained have been so effective that its organization and procedure have been studied by other countries as a basis for the establishment of similar organizations. Introductions obtained by exploration and through contacts built up with foreign research workers, nurserymen, botanists, explorers, and plantmen, as well as our own consular officers and commercial and agricultural attaches, have developed into important crops having a high economic value in our domestic agriculture.

(a) Plant Exploration and Collection.-- Foreign explorations are carried on by agricultural explorers for the purpose of receiving new and promising types of plants superior to those now grown in this country or having promise in aiding in the development of new crop industries and further advancing our agricultural and horticultural interests through breeding, development of disease-resistant crops, and meeting the changes in shifting economic needs, as well as contributing to such broad problems as erosion control, range improvement, and beautification of the home and its surroundings. As an adjunct to field operations, worldwide exploration work is carried on through correspondents and collaborators in foreign countries, having in view the same objects and purposes.

Since this work is carried on with a view to aiding agriculture in all parts of the country, it is widely regional. Important grain introductions include varieties of wheat, barley, rye, oats, rice, and grain sorghums which have become standard over wide areas of our grain-growing regions. Forage introductions of varieties of alfalfa, soybeans, lespedezas, grasses, and vetches include many which have become an indispensable part of our agriculture. One cotton variety, the Acala, has been developed into the single variety of importance around which the cotton industry of the Southwest largely centers. As a result of most recent explorations, potatoes, tobaccos, and a wide range of vegetables have been received for work in major breeding projects for other divisions of the Bureau of Plant Industry. While results

in the field of horticulture are slower because of the long-time nature of most of the crops, certain introductions of citrus fruits, avocados, and nectarines have become commercially important crops and other introductions have been of material assistance to breeders in the development of new varieties and disease- and insect-resistant root stocks. The annual revenue for any one of several of these introduced crops is greater than the total government appropriations for this project since its initiation.

Any interruption of introductions as related to crop-breeding projects may mean the interruption of production, since disease problems are never absolutely solved and the program for breeding disease-resistant varieties and strains must be a continuous defensive.

(b) Field Testing of Introduced Plants.-- Experimenters' service activities under this appropriation include the widespread regional testing of all introduced plant material, with a view to determining its adaptability to the soils and climates of this country. This is accomplished by means of organized cooperation with crop specialists of the United States Department of Agriculture, State agricultural colleges and experiment stations, botanic gardens, and arboreta, together with selected lists of nurserymen and private individuals. Similar tests and experiments are carried on at four special plant-introduction gardens so located as to receive widespread regional effects of soil and climate.

This work is an essential part of plant introduction. Before extensive cultivation of introduced plants can be advised, reliable information must be obtained concerning their adaptability and their potential value to American agriculture and horticulture. This information can be obtained only by means of widespread field tests. A vital activity of this service is to prevent the bringing in of new insect pests or diseases incident to the introduction of plant material. Special facilities for growing and propagating under quarantine and detention, under rigid control, are utilized for this purpose.

(c) Plant Geography and Bibliographical Investigations.-- Studies are made of the relation of crop distribution to climatic and soil conditions and of the important problems of plant introduction from a geographical point of view for the purpose of locating foreign sources of potentially valuable crops and to insure that such crops, when introduced, will be provided with soil and climatic conditions suited to their needs. This work is essential to the development of a proper and intelligent background for plant introduction and the necessary testing work connected therewith. Its purpose is to chart the field in advance so that a minimum of time and effort will be lost in the search for new crops and the proper placing of these crops for experimental use. Unless adequate plans are made in advance through this project, much of the efficiency of the introduction procedure would be lost.

(t) PLANT NUTRITION

This item, under which \$16,024 was appropriated in the 1940 Act, is merged in the estimates for 1941 with the item "Tobacco Investigations".

(u) RUBBER AND OTHER TROPICAL PLANTS

This item, under which \$46,749 was appropriated in the 1940 Act, is merged in the estimates for 1941 with the item "Plant Exploration and Introduction".

(v) SOIL CHEMICAL AND PHYSICAL INVESTIGATIONS

Appropriation Act, 1940	\$76,700
Budget Estimate, 1941	70,400
Decrease	<u>6,300</u>

PROJECT STATEMENT

Projects	1939	1940	1941	Increase or Decrease
		(Estimated)	(Estimated)	
1. <u>Soil chemical and physical investigations:</u>				
(a) <u>Chemical and physical analyses and tests of soils and soil materials.</u>	\$13,564	\$13,700	\$11,900	- \$1,800 (1)
(b) <u>Investigations of the chemical and physical properties of soils.</u>	48,260	48,500	46,800	- 1,700 (2)
(c) <u>Selenium and related investigations.</u>	14,450	14,500	11,300	- 3,200 (3)
Additional for administrative promotions	- - -	- - -	400	+ 400 (4)
Unobligated balance	436	- - -	- - -	- - -
Total appropriation	76,700	76,700	70,400	- 6,300

INCREASES OR DECREASES

The net decrease of \$6,300 in this item for 1941 consists of:

A decrease of \$6,700 in work projects "a", "b", and "c" under the project Soil chemical and physical investigations, as follows:

(1) Chemical and physical analyses and tests of soils and soil materials, \$1,800: This reduction contemplates discontinuing part of the work now done in the examination of soils for various government agencies, including Soil Survey.

(2) Investigations of the chemical and physical properties of soils, \$1,700: This reduction contemplates discontinuing a part of the research on the chemical and physical properties of soils.

(3) Selenium and related investigations, \$3,200: This reduction contemplates discontinuing a part of the research on the natural occurrence of selenium in soils and in the plant products grown thereon as this relates to the toxicity of these plant materials in human and animal use.

(4) \$400 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

The purpose of this work is to determine in a systematic manner the detailed physical properties of groups of soils, to establish their chemical composition and distinctive chemical properties, to determine their relationship to each other and to their parent material and climatic environment, and to furnish this fundamental information to soil workers in different fields.

Research is performed on the chemical and physical properties of soil. This includes measurement of different properties and components and their significance in soil classification and utilization. It includes other phases of soil science, such as the quantities of selenium, arsenic, and other elements which may have injurious effects upon plant growth or produce toxic vegetation, and other substances which are essential to plant or animal growth and may be deficient in some soils. It also includes the making of numerous chemical and physical measurements upon soils for the use of other Government agencies, particularly for other divisions of the Bureau of Plant Industry. These service measurements include mechanical analyses, nitrogen determinations, partial and complete soil analyses, etc., which are required in the solution of specific problems in the Soil Survey Division, Soil Conservation Service, Bureau of Animal Industry, and Public Buildings and Grounds projects and other problems involving soil and soil materials.

In the research work, problems involving soil colloids--the active components of the soils--have a prominent place since a knowledge of their character and composition is essential to not only satisfactory soil classification but also to soil utilization and conservation.

Soil organic matter is being investigated, including research on peat with a direct bearing upon the better utilization of the 110,000,000 acres of domestic peat deposits. Investigations are being conducted upon the moisture relations of soils and upon heat conductivities. A special study is being carried on dealing with rapid methods of determination of soil needs and upon their reliability for soil diagnosis. The demonstrated existence of naturally toxic soils as a result of the researches upon selenium in soil has focused attention upon the need for research with reference to other injurious elements, such as barium, lead, and arsenic, and this work is being carried on as rapidly as is possible.

(a) SOIL-FERTILITY INVESTIGATIONS

Appropriation Act, 1940	\$121,622
Budget Estimate, 1941	122,622
Increase	<u>1,000</u>

PROJECT STATEMENT

Projects	1939	1940	1941	Increase
		(Estimated)	(Estimated)	
1. <u>Soil-fertility investigations:</u>				
(a) Citrus soil-fertility investigations	\$ 8,900	\$ 8,900	\$ 8,900	- - -
(b) Pecan soil-fertility investigations	12,100	19,300	19,300	- - -
(c) Cotton soil-fertility investigations	6,600	6,700	6,700	- - -
(d) Potato soil-fertility investigations	8,600	8,700	8,700	- - -
(e) Sugarcane soil-fertility investigations	12,950	13,100	13,100	- - -
(f) Sugar beet soil-fertility investigations	11,150	11,200	11,200	- - -
(g) Soil-fertility investigations on truck and miscellaneous crops	9,600	9,750	9,750	- - -
(h) Soil improvement by crops and cropping methods, Investigations of	7,800	7,807	7,807	- - -
(i) Biochemical soil-fertility investigations	46,335	- - -	- - -	- - -
(j) Cotton root-rot soil and fertilizer investigations	36,278	36,165	36,165	- - -
Additional for administrative promotions	- - -	- - -	1,000	+\$1,000(1)
Unobligated balance	1,144	- - -	- - -	- - -
Total appropriation	168,457	121,622	122,622	+ 1,000

INCREASE

(1) \$1,000 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

The broad purpose of this appropriation is to determine ways and means of economically maintaining the fertility of important soil types throughout the United States. In order to accomplish this purpose a wide range of field, greenhouse, and laboratory soil fertility research has been established to study the organic and inorganic nutritional relationships underlying the production of different crops in the principal agricultural regions. Chief among the soil fertility studies being made are those to determine organic matter needs of soils and how they can best be supplied through improved green manuring and rotation practices; soil acidity control measures and their influence upon crop yield and quality; the plant food or fertilizer requirements of leading crops; the economic utilization of fertilizers and fertilizer materials and how to apply them to eliminate crop injury; the evaluation of new fertilizer materials for crop production purposes; the means of promoting the use of plant food materials so as to obtain high quality crop products; the need for and the effect of elements other than those commonly supplied to crops by natural or artificial means upon plant growth and production, including boron, copper, manganese, zinc, and other of the uncommon elements; and the influence of soil fertility practices, including the use of fertilizers, upon malnutritional disturbances of plants and upon certain plant diseases.

Soil fertility and the fertilizer requirements of the principal soil types are being determined for a number of the important crops, including cotton, sugar beets, sugarcane, sweet potatoes, potatoes, tomatoes and other truck crops, corn, wheat, pecans, citrus and other subtropical fruits, representing hundreds of millions of the country's wealth. There are used in the United States approximately 8,000,000 tons of fertilizer costing approximately \$250,000,000 annually. The cotton crop alone requires about 1,200,000 tons and the potato crop, about 600,000 tons of fertilizer. Much of this is wasted through improper use and placement and the soil fertility studies with fertilizers have helped materially in its proper and economic use in the production of high quality products. Important results have been achieved in modifying fertilizer practices or suggesting new uses of fertilizer in new regions or with crops where fertilizer had not been used, in developing an economic program of increased profit to the farmer and to the community. The work is being carried on in about twenty states in cooperation with state agricultural experiment stations. Field stations are being maintained at Chadbourn, North Carolina; Columbia, South Carolina; Albany, Georgia; Orlando, Florida; Austin, Texas; Houma, Louisiana; Shreveport, Louisiana; Scottsbluff, Nebraska; and Davis, California.

(x) SOIL MICROBIOLOGY INVESTIGATIONS

Appropriation Act, 1940.	\$39,854
Budget Estimate, 1941.	<u>40,054</u>
Increase	<u>200</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
1. <u>Soil microbiology in-</u>				
<u>vestigations:</u>				
(a) Soil inoculation				
investigations and				
inspection of cul-				
tures.	\$18,671	\$19,000	\$19,000	- - -
(b) Soil population				
investigations in				
relation to crop				
production, bearing				
primarily on fungi,				
bacteria, algae, etc.	20,854	20,854	20,854	- - -
Additional for adminis-				
trative promotions. . . .	- - -	- - -	200	+\$200 (1)
Unobligated balance . . .	329	- - -	- - -	- - -
Total appropriation	39,854	39,854	40,054	+ 200

INCREASE

(1) An additional \$200 is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941

WORK UNDER THIS APPROPRIATION

General.-- The purpose of this appropriation is to inspect and test commercial cultures of legume nodule bacteria, including researches upon legume inoculation, and for researches upon micro-organisms in the soil, their activities, and relationships to crop production.

(a) Soil Inoculation Investigations and Inspection of Cultures.-- From about 3,000,000 "bushel units" of legume inoculants sold during fiscal year 1938, 700 samples have been tested as to their ability to produce nodules on plants grown in the greenhouse or field or both. Less than 5% were unsatisfactory compared to 13% in the previous year. Most manufacturers have withdrawn the "dry" inoculants which proved inefficient. Improvements developed in inspection procedure include artificial illumination to support growth in the greenhouse in winter, and slight addition of nitrogenous fertilizers to improve conditions for growth. Tests of planting inoculated legumes in contact with fertilizers showed that fertilizers in standard strengths in direct contact with the seed interfere with the development of the inoculants in most cases. Further investigations are in progress in the search for safe methods of testing inoculants in the field.

(b) Soil Population Investigations in Relation to Crop Production, Bearing Primarily on Fungi, Bacteria, Algae, etc.-- At present the emphasis is being placed upon the study of the bacteria, fungi and slime molds in soil. Of the bacteria, two groups are under consideration, the *Azotobacter* and the spore-forming groups. *Bacillus atterrimus* and *E. niger* have been studied and definitely characterized so that the confusion of these two has been cleared up. Numerous cultures of fungi have been identified, notably those found on the roots of crop plants and in connection with studies on the possible control of root-rots by a non-pathogenic soil flora. Work on the slime molds has been continued, especially the ability of the amoeboid phase to devour soil bacteria and also other bacteria associated with plant and animal diseases.

(y) SOIL SURVEY

Appropriation Act, 1940	\$298,708
Budget Estimate, 1941	<u>275,900</u>
Decrease.	<u>22,808</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increases or Decreases
1. <u>Soil Survey:</u>				
(a) Investigations, classification and mapping of soils in the field.	\$207,039	\$213,170	\$191,462	- \$21,708 (1)
(b) Field inspection of soil surveys and correlation of soil types and series	32,538	32,788	30,788	- 2,000 (2)
(c) Adjusting, constructing, and drafting soil maps and charts for reproduction	52,500	52,750	52,750	- - -
Additional for administrative promotions	- - -	- - -	900	+ 900 (3)
Unobligated balance	6,631	- - -	- - -	- - -
Total appropriation:	298,708	298,708	275,900	- 22,808

INCREASES OR DECREASES

The net decrease of \$22,808 in this item for 1941 consists of:

A decrease of \$23,708 in work projects "a" and "b" (above) under the project Soil Survey as follows:

(1) Investigations, classification, and mapping of soils in the field, \$21,708: This decrease contemplates a reduction in field work of the Soil Survey cooperative with state agricultural experiment stations and other agencies, in the classification and mapping of soils as a basis for sound land-use practices; and a proportionate reduction in Departmental services from Washington.

(2) Field inspection of soil surveys and correlation of soil types and series, \$2,000: This decrease contemplates a reduction in the field inspection work proportionate to the contemplated reduction in soil surveys as indicated in (1) above.



This reduction contemplates discontinuing the services of the following personnel:

Departmental -

- 1 - P-5 Senior Soil Scientist
- 2 - P-2 Assistant Soil Scientists
- 4 - P-1 Junior Soil Scientists

The reduction contemplates curtailment of summer soil survey activities in New York, New England, Minnesota, Michigan, Indiana, and Washington; with proportionate curtailment of winter activities in Alabama, Florida, Texas, and Virginia.

(3) \$900 additional estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

The Soil Survey provides soil maps necessary for the classification of rural lands according to their capabilities for use. The objects of this research are (1) to determine the morphology of soils; (2) to classify them according to their characteristics; (3) to show their distribution on maps; (4) to assemble the results of experience and research according to the soil types; and (5) to describe the soil types, particularly in reference to their capabilities for the production of crops. The published maps and reports are used as the factual basis for the development of sound land-use practices.

The object of the Soil Survey is to classify and map the soils of the United States to describe their characteristics, especially in reference to the production of various crop, grasses and trees under practical systems of land management. The ultimate purpose is to provide accurate soil maps of the country necessary for the classification of rural lands and for the factual basis in the development of any rational program of land use, whether planned by public agencies or the individual farmer. The work comprises the determination of the character of soils, the definition of soil types, development of a uniform system of classification for the Nation, delineation upon maps of the boundaries of each type, the correlation of the various soil types in the country, and the interpretation of their relationship to the production of crops, grasses, and trees. This information is made available in published form to those interested in all phases of agriculture and other problems of land use. State cooperating agencies and other public organizations are furnished advance photographic copies of the field work for their immediate use where needed at once. Essentially all of the work is accomplished in financial cooperation with the various States and is necessary to them for the development of programs for the readjustment of their agriculture on a sound basis. For the past several years special reports and surveys have been made for various other governmental agencies which have need for physical data regarding land in order to develop the programs which are under their responsibility.

(z) SUGAR-PLANT INVESTIGATIONS

Appropriation Act, 1940	\$330,000
Budget Estimate, 1941	<u>301,300</u>
Decrease	<u>28,700</u>

PROJECT STATEMENT

Projects	1939	1940 :(Estimated):	1941 :(Estimated):	Increase or decreases
1. <u>Sugar beet investigations:</u>				
(a) Sugar-beet leaf-spot and root-rot control investigations	\$33,502	\$33,713	\$29,713	-\$4,000(1)
(b) Sugar-beet curly-top control investigations, including breeding and other means	95,043	96,063	87,063	- 9,000(2)
(c) Sugar-beet production and breeding investigations	74,794	75,018	68,018	- 7,000(3)
Total, Sugar beet investigations	203,339	204,794	184,794	-20,000
2. <u>Sugarcane investigations:</u>				
(a) Sugarcane cultural investigations	30,535	30,535	27,535	- 3,000(4)
(b) Sugarcane disease investigations	30,917	38,417	35,417	- 3,000(5)
(c) Sugarcane breeding investigations	48,320	49,118	45,118	- 4,000(6)
(d) Sugarcane deterioration in storage, investigations of	7,136	7,136	7,136	- - -
Total, Sugarcane investigations	116,908	125,206	115,206	-10,000
Additional for administrative promotions	- - -	- - -	1,300	+ 1,300(7)
Unobligated balance	2,253	- - -	- - -	- - -
Total appropriation	322,500	330,000	301,300	-28,700

INCREASES OR DECREASES

The net decrease of \$28,700 in this item for 1941 consists of:

(1), (2), and (3). A decrease of \$20,000 in project "Sugar beet investigations", distributed by work projects as follows:

(a) Sugar-beet leaf-spot and root-rot control investigations, \$4,000: This reduction contemplates a curtailment in breeding for leaf-spot resistance and in research on root-rot control done in New Mexico, Colorado, and Virginia, the results of which are applicable in Michigan, Ohio, Indiana, Minnesota, North Dakota, Iowa, Nebraska, and Colorado.

(b) Sugar-beet curly-top control investigations, including breeding and other means, \$9,000: This reduction contemplates a curtailment of breeding operations in developing curly-top resistant sugar beets in Utah, the results of which are applicable in Washington, Oregon, California, Idaho, Utah, and western Colorado.

(c) Sugar-beet production and breeding investigations, \$7,000: This reduction contemplates abandonment of cooperative cultural investigations in Ohio and Minnesota, and curtailment in Michigan, and Indiana, and curtailment of work to develop better methods and to locate more favorable localities for producing sugar beet seed of the improved strains developed in the breeding program in Washington and Oregon.

(4), (5), and (6). A decrease of \$10,000 in the project "Sugarcane investigations", distributed by work projects as follows:

(a) Sugarcane cultural investigations, \$3,000: This reduction involves discontinuing cooperative work with Mississippi State Station on sugarcane syrup, discontinuance of one phase of the work at Poplarville, Mississippi, production of sugar from sorgho, in cooperation with the Bureau of Agricultural Chemistry and Engineering at Meridian, Mississippi.

(b) Sugarcane disease investigations, \$3,000: This reduction involves curtailment in the work with chlorotic streak of sugarcane in Louisiana.

(c) Sugarcane breeding investigations, \$4,000: This reduction contemplates a curtailment in operations of breeding sugarcane more resistant to disease and more tolerant to cold.

The reduction contemplates discontinuing the following personnel:

Field

- 1 - P-2 Assistant pathologist
- 1 - P-2 Assistant physiologist
- 1 - P-2 Assistant agronomist
- 3 - Agents

The reduction contemplates the following distribution by geographic divisions:

Departmental	\$3,200	Michigan	\$1,500
Canal Zone	250	Minnesota	4,800
California	5,400	Mississippi	750
Florida	3,000	New Mexico	500
Georgia	750	Ohio	1,000
Idaho	1,000	Utah	3,900
Louisiana	3,750		

(7) \$1,300 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

General.--- Farmers in continental United States, under the terms of the Sugar Act of 1937, have the responsibility of providing 29.48 percent of the national requirement of sugar. Farsighted national policy with respect to this essential foodstuff requires not only that American growers be assisted so that, year in and year out, they may produce adequately, but may advance to the position of producing economically a greater proportion of the national requirement. The potentialities for a greatly expanded domestic production need be explored, as a safeguard, should any international crisis interfere with supplies which now come from other than continental sources. Investigational work conducted under this appropriation seeks to secure and maintain a stable production of sugar beets and sugarcane by safeguarding the crop against losses resulting from diseases or other controllable hazards. The work under this appropriation consists chiefly of research on problems connected with the growing of sugar beets, the production of sugar-beet seed, and the growing of sugarcane in the continental United States, including the control of diseases affecting these crops. The method stressed in accomplishment of these ends is development and introduction of varieties improved in respect to disease resistance and other qualities. Researches are also conducted to discover improved agricultural practice for efficiently securing better stands, better yields at lower costs per crop unit, and a higher quality product. Research of this character contributes to stabilization of production by assuring fairly definite yield expectations, regardless of disease-inducing weather variations, and operates to raise the level of profitability of these crops. Methods developed and results of the research pertaining to sugarcane are also applicable to the sugarcane industry of Puerto Rico, Hawaii, and the Virgin Islands.

1. Sugar Beet Investigations.--- Improved sugar-beet varieties are developed to secure types better adapted to the conditions of the respective districts engaged in sugar-beet growing. In securing varieties resistant to curly-top, outstanding plants are selected which because of their genetic make-up are able to grow in spite of curly top. Through continued selection under conditions of heavy exposure, the less desirable elements of progenies are eliminated and strains improved in curly-top resistance. Agronomic experiments are conducted with these strains to evaluate them and discover those of

most promise. The domestic seed enterprise, which arose as a result of research supported by this appropriation, plays a significant part. The stocks of seed arising from breeding work are small and, when a desirable variety is found, must be increased. By cooperative endeavor with beet sugar companies who act as agents for the farmers who will use the improved varieties, the small stocks are increased, under technical supervision, to a quantity adequate to supply the planting stock for the commercial seed fields. In other phases of the sugar-beet-improvement program, as in the production of leaf-spot-resistant varieties, selection and continued inbreeding have been found necessary to secure the desired degree of resistance. But the resistant, inbred lines secured are somewhat lacking in vigor, which precludes their direct use, hence they must be recombined. In other words, the breeding program found valuable in corn improvement finds direct application in sugar-beet improvement. In both methods of varietal improvement, the seed supply is grown at home, and the performance of these strains is rapidly building a strong demand for the home product. Special investigations on the nature and control of curly top, leaf-spot, seedling diseases, and root rot are conducted. Investigations on seedling diseases and root rot are concerned with an important cause of loss in sugar-beet growing in the humid area. Cooperation is with state experiment stations, the Bureau of Entomology and Plant Quarantine, the Division of Soil-Fertility Investigations, and the Bureau of Agricultural Engineering.

Field stations and laboratories are maintained at the following points: Twin Falls, Idaho; Riverside, California; Fort Collins, Colorado; Salt Lake City, Utah; and Rocky Ford, Colorado. Field experiments, largely cooperative, are conducted at Davis, California; Logandale, Nevada; Las Cruces, New Mexico; Denton and Lubbock, Texas; Scottsbluff, Nebraska; St. Paul, Minnesota; Sikeston, Missouri; Knoxville, Tennessee; Holgate, Ohio; East Lansing, Michigan; and Arlington, Virginia.

2. Sugarcane Investigations.— To meet a high per capita consuming demand, the United States and dependencies produce more sugar from cane than any other country. For that reason, much of the work of this project is of a fundamental nature applicable to conditions in Puerto Rico, Virgin Islands, Hawaii, and the Philippines, as well as the mainland sugar-producing areas, Louisiana and Florida, and the cane syrup-producing states, Georgia, Alabama, Mississippi, Texas, and South Carolina. The program is built around the improvement of varieties of sugarcane to meet the needs of cane producers in various American producing areas. Climatic, soil, and disease problems are evaluated to determine rational limits of improvement. World-wide collections of the wild and cultivated forms of *Saccharum* and related genera constitute the source of material. From many parts of the tropical and temperate zones plants having a wide range of characteristics have been assembled and further collections are being made to determine the range of natural variation within the species. Classification of the plants is followed by studies to determine the characteristics valuable for economic use and to segregate parent material suitable for breeding. The reference collections of cane varieties after passage through a rigid quarantine procedure at Arlington Farm are assembled at breeding stations located geographically with the view of synchronizing the blooming of short and long day varieties at points where interchange of pollen or other germ plasm between stations may be made rapidly by air transport.

The Eastern United States, Central America, and the west coast of South America provide locations at suitable intervals of latitude for this work. Utilizing these stations during the present season, it was possible for the first time to cross the short-day tropical forms with a cold-resistant long-day form recently discovered growing wild along river banks in Turkestan, far north of the previously-known range of sugar-cane. Field stations and laboratories are maintained at the following points: Canal Point, Florida; Houma, Louisiana; Cairo, Georgia; Meridian, Mississippi; Summit, Canal Zone; and Arlington Farm, Virginia.

(a) TOBACCO INVESTIGATIONS

Appropriation Act, 1940:

"Tobacco Investigations"	\$135,344 (a)
"Plant Nutrition"	16,024 (a)
Total available, 1940	\$151,568
Budget Estimate, 1941	141,204
Decrease	<u>10,364</u>

(a) The 1941 estimates provide for the consolidation of these items under the title "Tobacco Investigations", tobacco being the plant chiefly used for the experimental work involved, with a reduction from \$16,024 to \$5,000 of plant nutrition investigations.

PROJECT STATEMENT

Projects	1939	1940	1941	Increase or Decrease
		(Estimated)	(Estimated)	
1. Tobacco investigations:				
(a) Cigar binder and filler production investigations . . .	\$3,429	\$5,717	\$5,717	- - -
(b) Flue-cured tobacco production investigations . . .	27,072	28,312	28,312	- - -
(c) Burley tobacco production investigations	8,727	9,235	9,235	- - -
(d) Maryland tobacco pro- duction investigations . . .	6,237	6,360	6,360	- - -
(e) Dark air-cured tobacco production investigations . . .	2,230	2,400	2,400	- - -
(f) Tobacco disease investi- gations	51,022	51,402	51,402	- - -
(g) Breeding and growing high nicotine tobacco for use in insecticides	9,749	10,050	10,050	- - -
(h) Tobacco breeding and physi- ological investigations . . .	39,308	38,092	27,068	-11,024 (1)
Additional for administrative pro- motions	- - -	- - -	660	+ 660 (2)
Unobligated balance	3,774	- - -	- - -	- - -
Total appropriation.	151,568	151,563	141,204	-10,364

INCREASE OR DECREASE

The net decrease of \$10,364 in this item for 1941 consists of:

(1) A decrease of \$11,024 under the work project "Tobacco breeding and physiological investigations". The item for "Plant Nutrition", previously a separate appropriation item, is consolidated with this work project in the 1941 estimates, the total item being reduced by the amount noted above. This reduction contemplates discontinuing a substantial part of the length-of-day investigations on crop plants in relation to growth and development in the District of Columbia and at Arlington Farm, Virginia.

(2) \$660 additional is estimated for administrative promotions in accordance with the plan which is being uniformly applied in the Budget Estimates for 1941.

WORK UNDER THIS APPROPRIATION

The tobacco crop of the United States, amounting to 1,400,000,000 pounds with a farm value of nearly \$300,000,000, is grown on 1,600,000 acres, distributed mainly through fifteen States. Tobacco manufactures yield an annual Federal revenue in excess of \$500,000,000. The average acre value of the crop is high (about \$180) but the cost of growing also is necessarily high and a fair margin of profit to the individual grower depends chiefly on his ability to consistently produce a high output of quality leaf rather than a large total acre yield. This is especially true under a program of controlled production involving both acreage and poundage. Numerous hazards are involved, including those of weather and destructive diseases. Successful cropping systems for tobacco lands need to be developed on the basis of specific effects of other crops on growth and quality of tobacco, their relation to prevalence and control of tobacco diseases and their ability to minimize effects of unfavorable weather conditions, including the important problem of soil erosion damage. For best results certain types of tobacco, making up more than half the total production, must be grown on light, infertile soils and carefully controlled intensive fertilization is essential. There are important problems in proper placement of the fertilizer, the role of elements previously neglected and sources and proportions of plant food elements, all of which must deal with varying weather conditions. In the interest of a more uniform output, standardization of varieties and strains, with elimination of many of the less desirable ones now grown, is needed. Unsatisfactory air curing methods now in use also constitute a hazard in producing high quality tobacco and in flue curing there is increasing need of perfecting heating systems whereby coal or oil may be substituted for wood as fuel.

During the past 25 years various tobacco diseases have become more and more prevalent, with a notable increase in soil-borne disease problems, largely because of lack of means for frequent shifts of the crop to new land. For example, in the Coastal Plain area of North Carolina, South Carolina, Georgia and Florida there are 600,000 acres of tobacco grown on soils more or less seriously infested with root-knot. The highly destructive black shank disease formerly confined to Florida has gained a foot-

hold in North Carolina and Tennessee. Granville wilt continues to spread in the south and there have been recent outbreaks of wildfire in Pennsylvania, Kentucky and Tennessee. Blue mold has now invaded every tobacco-growing state with the exception of Wisconsin. Much progress has been made on the tobacco disease control problem but the main object is to place the control on such a practical and economical basis that every grower will feel justified in using the necessary measures and thereby benefit through reduced cost of production, stabilized production and better quality.

Tobacco culture is highly specialized and each distinctive type presents special cultural problems because of varying standards of quality and regional differences of soil, climate, disease distribution, etc. Cooperative experiments are carried out at the agricultural experiment stations of tobacco-growing states and no independent field stations are maintained.

In the cigar tobacco production investigations conducted in Massachusetts, Connecticut, Wisconsin, and Pennsylvania, one of the most urgent needs is to discover practical means for increasing the potash content of filler tobacco, which is essential to needed improvement in smoking qualities as well as for increasing resistance to wildfire disease in the field. This is an important problem applicable also to other tobacco grown on heavy soils, including Burley, which can not be met by ordinary methods of fertilization. A root-rot resistant strain of Havana Seed which is being developed promises to replace all other strains in the Connecticut Valley.

In the flue-cured tobacco production investigations in North Carolina, South Carolina, and Georgia, successful work on control of root-knot by crop rotation has been conducted but, in addition, certain highly resistant tobaccos from Central America have been obtained and from these, resistant flue-cured types are being developed. No foreign tobaccos highly resistant to Granville wilt could be found but by combining the partial resistance of each of two varieties by hybridization, it now appears that control of the disease can be accomplished. Measures for control of blue mold by spraying with copper oxide and gas treatment with benzol or paradichlorbenzol have been developed and work is in progress to simplify and reduce the cost of these treatments. It is believed new black shank resistant strains will soon be ready for general use. Progress is being made in improved construction and management of tobacco seed beds, including the disease control feature.

In the cooperative Burley tobacco production investigations in Tennessee and West Virginia attention is being given to developments of cropping systems which will afford protection against soil erosion but at the same time will aid in production of leaf of high quality and prevention of root-rot damage. Special attention also is being given the problem of securing increased potash absorption from the soil by the crop. In breeding work the principal objective is to obtain disease resistant Burley strains which will conform in all respects to established standards of quality.

Maryland tobacco production research includes effects of natural vegetation on quality of leaf, effects of controlled water supply (irrigation) and fundamental studies on tobacco fertilization.

In laboratory and greenhouse work at Washington and Arlington Farm study is made of combustibility, aroma, nicotine content and other elements of quality as affected by fertilization, soil type and cultural practices, development of new and improved breeding methods and the mineral nutrition requirements of tobacco. In developing the possibilities in growing tobacco for use as insecticide emphasis is being placed at present on producing, by new breeding methods, types, yielding high tonnage and high content of nicotine.

SUPPLEMENTAL FUNDS

Projects	Obligated, 1939	Estimated obligations, 1940	Estimated obligations, 1941
<u>Special Research Fund, Department of Agriculture:</u>			
Special research projects :	\$130,633	\$140,007	^{141,586} \$140,007
Special research laborator- ies in major agricultural regions	333,306	330,300	330,300
Total, Special Research Fund	463,939	470,307	^{472,080} 470,307
<u>Conservation and Use of Agri- cultural Land Resources, Depart- ment of Agriculture (New uses and markets for farm commod- ities, regional laboratories and surveys): Assistance in survey to determine location of regional research laboratories authorized by Sec. 202 of Agricultural Adjustment Act of 1938</u>	3,387	- - -	- - -
<u>Public Works Administration, Allotment to Agriculture, 1935- 1941 (B.P.I.): for flood control work on the Pecos River</u>	- - -	4,000	3,500
Total, Supplemental Funds	467,326	474,307	^{475,586} 473,807



PASSENGER-CARRYING VEHICLES

The work of the Bureau of Plant Industry is necessarily, to a very large extent, in the country where transportation through the use of automobiles is essential to effective work. The authorization for the purchase of passenger-carrying vehicles for the Bureau of Plant Industry contemplates a decrease of \$12,805 (\$25,325 in 1940, \$12,520 estimated for 1941). The estimate for 1941 will permit the needed replacement of 19 cars at an average of \$600 each when exchange allowances are taken into account, and the purchase of 2 additional cars at an average of \$550. These 2 new cars are needed to carry on increased activities and new personnel under the Division of Soil Survey and will be used for conveying employees and officials to experimental plots and to carry delicate instruments for field use.

RELOCATION OF ARLINGTON EXPERIMENT FARM

Appropriation Act, 1940	- - -
Budget Estimate, 1941	\$500,000
Increase	<u>500,000</u>

PROJECT STATEMENT

Projects	1939	1940 (Estimated)	1941 (Estimated)	Increase
Relocation of Arlington Experiment Farm	- - -	- - -	\$500,000	+\$500,000 (1)
Total appropriation.	- - -	- - -	500,000	500,000

INCREASE

(1) This appropriation is requested to enable the Department to relocate and commence the removal and reestablishment of the extensive experimental farm operated since 1900 near Rosslyn, Virginia, across the Potomac River from Washington. Since 1900 laboratories, greenhouses, and other facilities have gradually been erected at Arlington Experiment Farm in order to permit the development of comprehensive research, much of it involving undisturbed continuity over a long period of time as a fundamental requirement of its value. To carry out the purpose of this appropriation in the most effective and economical manner and provide for continuation of the fundamental experimental work being conducted at Arlington Experiment Farm, it will be necessary to purchase land elsewhere, plan, construct and equip buildings and provide facilities needed to carry out investigations.

For many years the question of the use of land on which the Farm is located has been a subject of discussion. The War Department has desired to secure the higher ground and the National Park Service has urged that the lower land adjacent to the River be available for inclusion in the park system. In recent years the uncertainty of the Department's tenancy of Arlington Experiment Farm has increased. During the current fiscal year it has been necessary for the Department to release a part of the farm for use of the War Department. The surrender of part of the land transferred to the War Department made it necessary for the Department of Agriculture to interrupt experiments which had been under way for a period of years. Further extension along these lines as desired by the War Department and the National Parks and Planning Commission cannot be made without jeopardizing vital agricultural research work.

After a thorough study of all factors concerned with the War Department and the National Parks and Planning Commission, the Department of Agriculture believes that the best interests of the Government will be served by the

transfer of the work of the Arlington Experiment Farm to the Research Center, Beltsville, Maryland, so that the Arlington Experiment Farm may be released to the War Department for certain developments consistent with plans of the National Parks and Planning Commission. This decision regarding the proposed transfer, in accord with an understanding with the Secretary of War and the Chairman of the National Parks and Planning Commission, is contingent upon the availability to the Department of Agriculture of another suitable site and of necessary funds to move, relocate, and reestablish the research program of the Department now carried on at Arlington Experiment Farm. It is, however, understood that, only as various research units are relocated and reestablished, certain land and facilities at Arlington Experiment Farm will be progressively released to the War Department and the National Parks and Planning Commission until the entire transfer of that Farm is consummated, over a period of years.

In order to complete the relocation, removal and reestablishment of Arlington Experiment Farm, it is estimated that a total of \$3,200,000 will be required, of which the \$500,000 estimated for 1941 is the first increment. The major portion of the work carried on at the Arlington Experiment Farm is under the direction of the Bureau of Plant Industry. However, during the period that the Department has been operating the Farm, other units of the Department have been located there, and the research program at Arlington now involves work carried on under the direction of four Bureaus (Bureau of Plant Industry, Bureau of Agricultural Chemistry and Engineering, Bureau of Entomology and Plant Quarantine, and Food and Drug Administration). The location at Arlington Experiment Farm of certain of the work now carried on there by these bureaus has to a certain extent been on the basis of opportunities and facilities that were available. With the relocation and reestablishment of the Farm, it will be necessary therefore to provide for continuation of the research program of the four bureaus.

The allocation of \$500,000 would make possible early initiation of the progressive removal and reestablishment of the Bureau of Plant Industry's work from the Arlington Experiment Farm, entailing (a) the purchase of necessary land suitable for experimental work with crops and soils and for building sites; (b) land improvements, as tile drainage and contouring, grading and laying off plots, irrigation and flood control; highways, culverts, bridges, fences, walks, landscaping, etc.; (c) establishment of facilities, as heat, water, sewage disposal, electricity, gas and telephones; (d) construction and equipment of greenhouses and headhouses; (e) construction and equipment of laboratory and office buildings; (f) construction and equipment of necessary service buildings, as shops, garages, seed and storage houses, barn, farm implement sheds, etc.; (g) construction of two cottages; and (h) necessary costs incidental to removal and reestablishment.

The estimated expenditures under this \$500,000 allocation are itemized as follows:

Personal services for preparation of plans and specifications	\$20,000
Purchase of land (farm land and building site)	220,000
Roads, culverts, bridges, drainage, and landscaping	10,000
Greenhouses and headhouses	<u>250,000</u>
Total	500,000

Moore





